Imperial Agricultural Bureaux

Tenth Annual Report

OF THE

Executive Council

1938-1939

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1940

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PREFACE

The Imperial Agricultural Research Conference, 1927, stressed (*a*) the need for scientists to be in touch with the progress of research throughout the world in their several branches, and (*b*) the difficulty therein owing to the great output of scientific literature and the diversity of languages in which it is published.

2. It recommended the Governments of the British Commonwealth to establish on a joint co-operative basis eight bureaux to collect, collate and disseminate information on research in eight selected branches of agricultural science and generally to assist research workers in the Empire with information relevant to their subjects. Each bureau was to be located at a research Institute specializing in its own branch of science so that the bureau officers should be in daily contact with men engaged on research in its own subject. These bureaux were to be financed from a common fund contributed by Empire Governments in agreed proportions and controlled by a Council composed of representatives of those governments on an equal footing.

3. Governments accepted these proposals. In November, 1928, a new type of inter-Imperial co-operative agency acceptable to all governments was worked out in detail. On 1st April, 1929, the Executive Council of the Imperial Agricultural Bureaux came into being. The eight bureaux started work in that year.

4. Following the Ottawa Conference of 1932 the work of several inter-Imperial agencies was examined and reported upon by the Imperial Committee on Economic Consultation and Co-operation (1933). This Committee approved of the bureaux organization and of its work, and extended the duties of the Council, *inter alia*, proposing that with effect from 1st October, 1933, it should also be responsible for the supervision and administration and finance of the Imperial Institute of Entomology and of the Imperial Mycological Institute.

5. It also enunciated certain general principles to be observed in regard to the organization of agencies for inter-Imperial co-operation and consultation, *e.g.*, Constitutional equality of participating governments in the appointment of the Authority administering the work; the provision of adequate finance for a definite period of years; careful and periodical examination of the work and organization of the Agency at Empire conferences suitable for the purpose, as without that assurance governments could hardly be expected to provide the adequate continuing finance; responsibility of the administering authority to all participating governments. All Governments accepted this report.

6. The British Commonwealth Scientific Conference (1936) conducted the first of these " periodical examinations ". It approved both the work and organization. It recommended the finance necessary until 1941–42, its distribution between governments, also the formation of two more bureaux, and certain modifications in practice designed to improve general efficiency. Governments accepted these proposals.

7. The organizations under the administration of the Executive Council are :—

The Imperial Institute of Entomology, with its branch the Laboratory for Biological Control of Insect Pests

The Imperial Mycological Institute and the Imperial Bureaux of

Soil Science.	Pastures and Forage Crops.
Animal Health.	Horticulture and Plantation Crops.
Animal Nutrition.	Agricultural Parasitology (Helminthology).
Animal Breeding and Genetics.	Dairy Science.
Plant Breeding and Genetics.	Forestry.

8. A " liaison " officer appointed by the appropriate department in each participating country keeps in touch with administrative matters, and in each country for each bureau a scientific officer is nominated as Official Correspondent to be " the general friend " on scientific matters of that bureau in that country. The Heads of the several Institutes at which bureaux are located act as Directors of the bureaux, thus giving the Council and bureaux the benefit of their wide experience and scientific knowledge. All other officers are whole-time servants of the Executive Council.

REPORT

At its meeting on the 19th October, 1939, the Executive Council of the Imperial Agricultural Bureaux adopted the following report relating to its tenth year's work—1st April, 1938, to 31st March, 1939.

A. *The Executive Council*

2. The Chairman, Lt.-Col. G. P. Vanier, D.S.O., M.C. (Canada) resigned his membership of the Executive Council in January, 1939, on his appointment as Canadian Minister at Paris. The Deputy Chairman, Mr. F. J. du Toit (South Africa) was absent at that time on leave to South Africa and a past Chairman, Mr. F. L. McDougall, C.M.G. (Australia) acted as Chairman for the last three months of the financial year.

Mr. W. M. Hamilton represented New Zealand during Mr. Nevill Wright's absence in that country.

B. *Summary of the Chief Points in the Year*

3. The year was one of general progress, in output of work, increased recognition of the two Institutes and the eight bureaux as centres of information, more varied use of the Farnham House Laboratory, the first arrivals from Mexico and the Andes of potatoes collected by the potato expedition, their growing on and description under expert supervision and a start in their distribution to contributing countries. Also by the end of March, 1939, all the recommendation of an administrative character made by the British Commonwealth Scientific Conference of 1936 were in operation. Thus :—

(*a*) The Governments of India and Burma had agreed on the ratio in which the Indo-Burma contribution should be shared and the Government of Burma had notified the Executive Council that it would shortly nominate its own representative on that Council.

The Government of the Anglo-Egyptian Sudan had agreed to increase, with effect from 1939, its contribution to the bureaux in the same proportion as other governments in accordance with the recommendations of the Conference.

All governments have therefore accepted in full the financial recommendations made by the Conference of 1936.

(*b*) The two new bureaux, Dairy Science and Forestry were at work.

(*c*) Six out of ten oversea countries represented on the Executive Council had nominated their liaison officers.

(*d*) Revised lists of those to whom bureaux journals were to be sent officially had been received from most of the contributing countries and were promised shortly by the others.

(*e*) The forecast of the Conference that with an increase in the use of the Farnham House Laboratory by contributing countries the Executive Council would be able to recommend a reduction in the annual contributions for occasional years proved correct.

4. Valuable discussions between the officers of the Institutes or bureaux with the specialists from overseas whom they serve took place at the Conference of the Colonial Directors of Agriculture in London in July, 1938, at the first Imperial Veterinary Conference in August, 1938, organized by the Executive Council in connection with the Bureau of Animal Health, and also during the visits of Dr. A. Gibson and Dr. A. J. Nicholson—the Chief Entomologists of Canada and Australia respectively—to the Imperial Institute of Entomology and to the Farnham House Laboratory.

C. *The Bureaux—Personnel*

5.—(i) *Deputy Directors.*

In the year, Dr. F. Kelly, Ph.D., Deputy Director of the Imperial Bureau of Animal Nutrition, Aberdeen, resigned his appointment to join the Iodine Educational Bureau; at the Imperial Bureau of Animal Breeding and Genetics, Edinburgh, Miss Cytovich continued in charge throughout the year, in the absence of a Deputy Director; at the Imperial Bureau of Plant Breeding and Genetics, Cambridge, Mrs. Ingham was in charge for some months during Dr. Hudson's absence through illness.

Dr. Kelly had shown himself exceptionally well fitted for bureau work and with the aid of his colleagues at the Rowett and Lister Institutes, Nutrition Abstracts and Reviews has attained a deservedly high reputation. All regretted his loss. The post has not yet been filled.

Dr. Hudson has returned to work restored in health.

6. The following appointments to posts of Deputy Directors were made during the year. Dr. J. E. Nichols, M.Sc., Ph.D., Professor of Agriculture at the University of Western Australia, Perth, to the Bureau of Animal Breeding and Genetics, Edinburgh. Mr. J. W. B. Sisam of the Canadian Forestry Department to the Forestry Bureau at Oxford.

Both started work after the close of the year.

Mr. W. G. Sutton, M.Sc., senior lecturer in dairy chemistry and bacteriology, Massey Agricultural College, New Zealand, who had been appointed Deputy Director of the Bureau of Dairy Science, Shinfield, Reading, arrived in August, 1938 on completion of his tour in Australia and South Africa.

These posts had been advertised in all contributing countries. Those selected came from oversea appointments. The Executive Council acknowledges the very great help given by senior officers overseas in advising on the suitability of the candidates who applied for these posts.

The post of Deputy Director of the Bureau of Animal Breeding and Genetics, Edinburgh, has been a difficult one to fill. Dr. Nichols' experience and knowledge of Empire countries should make him well fitted for that post. The Executive Council wishes to acknowledge work done by Miss Cytovich whilst she has been in charge, and of the assistance given to the bureau by the scientific staff of the Institute of Animal Genetics, Edinburgh.

7.—(ii) *Scientific Assistants.*

Dr. S. Ellerton, Ph.D., was appointed Assistant in the Bureau of Plant Breeding and Genetics, Cambridge, in the place of Mr. J. L. Fyfe, B.Sc., who had accepted a research post at the Plant Breeding Institute.

Dr. H. Nicol, M.Sc., Ph.D., was appointed Assistant in the Bureau of Soil Science, Rothamsted, in place of Mr. A. J. L. Lawrence who had accepted a post under the War Office.

8. *Conferences :—*

(i) Conference of Colonial Directors of Agriculture. July, 1938, London.

(ii) First Imperial Veterinary Conference. August, 1938, London.

(iii) Conference of the Second and Third Commissions of the International Society of Soil Science. July, 1938, Finland.

The first of these Conferences was organized by the Colonial Office. One session was devoted to discussions of the services of the Institutes and of the Bureaux to workers in the Colonial Dependencies. The senior officers of the Bureaux attended and took part. Directors or Deputy Directors also took part in some of the particular sessions, *e.g.*, those on Soil Conservation, Animal Husbandry, Nutrition.

9. The Imperial Veterinary Conference held in London in August, 1938, was the first of its kind. All governments had approved of its being held. All sent strong delegations, consisting for the most part of Senior Veterinary Officers and specialists in various branches. This was the first occasion since its start in 1929, that the work of the Bureau of Animal Health was considered jointly and formally at a fully representative meeting of Veterinary Officers. That in itself was most useful. In addition special sessions were devoted to discussions on particular diseases : *e.g.*, Foot and Mouth, Caseous Lymphadenitis of Sheep ; Virus Diseases of Animals, Bovine Mastitis, Johne's Disease, etc.

10. Both Conferences—Colonial and Veterinary—emphasized the value of the information services rendered by the bureaux. At both similar suggestions or proposals were made, viz. :—

(i) that abstracts given in the journals should be fuller and longer ;

(ii) that review articles whether issued as Technical Communications or at times printed in the Journals were specially useful and more should be issued.

In essence both of these are demands for increased output from the bureaux.

11. The second proposal caused no differences of opinion. The first did. At the base it is the dilemma which faces both compilers and users of abstract journals :—the ever present conflict between the need of covering adequately a steadily increasing volume of literature and the need for keeping the size of journals within reasonable limits. The practice of the bureaux is to treat more fully the papers which are intrinsically more important and those which appear in journals unlikely to be accessible to subscribers to the bureaux journals or printed in languages with which most of them are unfamiliar.

12. The demand from both Conferences for more Technical Communications or review articles is especially noteworthy. The same opinion has been expressed by senior officers from several countries when on visits to the bureaux. Incidentally it is a strong general approval of those already issued. The point was made that these should be as concise as possible and one recently issued was cited as being too long. The reason for a demand for this type of publication when well done is obvious. The review or Technical Communication brings together under critical examination the information available on a particular disease or subject. That is obviously a useful service. It is also a natural corollary to an abstract journal, the purpose of which is to enable research workers and others to be abreast of current information as it appears. The utility of such reviews depends primarily on careful selection both of the subject and of those whose assistance is sought in its compilation. Both of these depend on the closeness of the contacts, and of the good feeling and confidence subsisting between the bureaux and the scientists they serve.

13. The Veterinary Conference approved of Index Veterinarius on its present lines. It, however, stressed the need for the Veterinary Bulletin being more up to date, and suggested that some sections might advantageously be expanded. The circulation—some 600 in all—was not considered satisfactory and should be capable of increase. The Conference also expressed a strong hope that the scientific staff on the bureau could be strengthened, especially in view of the work recommended to be undertaken.

The discussions at the Conference on particular diseases afforded an opportunity—believed to be the first that has ever occurred—to senior veterinary officers from the various countries, to explain the relative significance of these diseases in their different countries and why particular measures of control were preferred.

14. As the meetings progressed delegates stated with increasing emphasis that the Conference had been well worth while and at their last meeting adopted the following resolution :—

> " The Conference considers that meetings of an Imperial Veterinary Conference at suitable intervals are of advantage and recommends

that, as a rule, they be arranged to fit in with meetings of the International Veterinary Congress, in Europe or in some portion of the British Commonwealth of Nations."

15. The Executive Council is grateful to governments for enabling these senior officers to attend and to all who helped to make the Conference a success: especially to H.M. Government in the United Kingdom for their hospitality and to the Governors and Principal (Professor J. Basil Buxton) for the arrangements at the Royal Veterinary College where most of the meetings took place.

16. Discussion on the second part of resolution XXXIV in the report of the British Commonwealth Scientific Conference, took place at the Conference of Colonial Directors. The Conference recommended that:—

> "In connexion with the work of the Imperial Bureaux, the Conference desires to invite attention to resolution XXXIV of the Commonwealth Scientific Conference which relates to co-operation in obtaining and maintaining plant material for crop improvement.
>
> The Conference is of opinion that it is most desirable that colonial research workers should be placed in a position to know the sources from which material of the recognized varieties of cultivated crops could be obtained and the nature of the varieties available.
>
> To this end it is recommended that the Executive Council of the Imperial Agricultural Bureaux or other suitable authority should consider the possibility of taking steps to cause lists to be prepared of the recognized and established commercial varieties of the more important tropical and sub-tropical crops grown in the different territories in the Empire, and to include therein brief descriptions of the characteristics of each variety and an indication as to the sources in each territory from which planting material would be available to research workers engaged in plant improvement problems."

After consultation between Sir Frank Stockdale, Agricultural Adviser to the Secretary of State for the Colonies and the officers of the bureaux of Plant Genetics and Horticulture, a form in which this information should be sought from departments in the Colonial Empire has been agreed.

17. The Conference of the Second and Fifth Commissions of the International Society of Soil Science met at Helsinki, in July, 1938. It was attended by Sir John Russell and Mr. G. V. Jacks, the Deputy Director of the Bureau of Soil Science. At this Conference scientists from several foreign countries gave an unexpected public commendation to "Soils and Fertilizers," the abstract journal of the bureau. Mr. Jacks reports that thereby "the number of subscribers in foreign countries, with whom the bureau is particularly anxious to make closer contact, has been considerably increased." This journal had only been issued in printed form from the beginning of 1938.

D. *Technical Communications and Reviews*

18. The following publications were issued during the year.

Title	*Issued by the Bureau of*
Soil Structure	Soil Science, Rothamsted Experimental Station, Harpenden, Herts.
Soil Borne Fungi and the Control of Root Disease	Do.
Bovine Mastitis	Animal Health, Weybridge.
Table of Composition of Foods	Animal Nutrition, Rowlett Research Institute, Aberdeen.
The Action and Use of Colchicine in the Production of Polypoid Plants.	Plant Breeding and Genetics, Cambridge.
Bibliography of Baking Tests of Wheat	Do.
Plant Injection for Diagnostic and Curative Purposes	Horticulture and Plantation Crops, East Malling, Kent.
The Frame-working of Fruit Trees	Do.
Helminth Parasites of New Zealand	Agricultural Parasitology (Helminthology), St. Albans, Herts.

These all deal with subjects—each in its own branch—of immediate interest.

19. The Executive Council had also approved the preparation and issue of Technical Communications on the following subjects. One or two have already appeared. The others will appear in due course.

Title	*To be issued by the bureau of*
The Nutritive Value of Sprouted Fodder (*a*)	Animal Nutrition, Aberdeen.
Survey of the Nutrition of the Rabbit	Do.
Methods of Breeding Crops Naturally Cross Pollinated	Plant Breeding and Genetics, Cambridge.
Bibliography on Cold Resistance in Plants. (*a*)	Do.
Lay-out of Field Experiments and the Statistical Interpretation of Results. (Elementary exposition).	Do.
Grassland Research in Australia	Pastures and Forage Crops, Aberystwyth, Wales.
Grassland and Forage Crop Research in the U.S.A. (*a*)	Do.
Fuit Juices and Related Products (*a*)	Horticulture and Plantation Crops, East Malling, Kent.
Plant Hormones and their Practical Importance in Horticulture. (*a*)	Do.
Bibliography on the Genetics of Drosophila (*a*)	Animal Breeding and Genetics, Edinburgh.
Helminth Parasites of Australia (*a*)	Agricultural Parasitology (Helminthology), St. Albans, Herts.
The Phosphatose Test (*a*)	Dairy Science, Shinfield, Reading.
Influence of Vegetation on environmental Climates	Forestry, Oxford.

Those marked (*a*) in the list above have been published and are available either at the bureau named or through the head office of the Executive Council.

E. *Bibliographies : or classified indexes to literature*

20. An abstract journal enables a research worker or field officer to be up to date on the current literature of his subject. A Technical Communication on a particular subject supplies those interested therein with critical reviews of scientific knowledge thereon. These two series of publications go very far towards bringing knowledge to the notice of scientific officers. A third type of service is provided by complete bibliographies of current literature. They cover all articles indexed by a bureau and not only those abstracted. They are laborious and costly to produce and free copies cannot as a rule be distributed. Moreover they are not undertaken unless it seems probable that the demand will cover the cost of printing and issue.

21. Two such bibliographies are issued annually. " Index Veterinarius," which is issued twice a year, and in all contains annually some 10,000 references. The " Bibliography of Helminthology," which as it deals with a very specialized subject is supplied free to recipients of " Helminthological Abstracts." It is also on sale separately.

In other cases the bibliography covers a term of years, often five or so. In 1935 the bureau of Soil Science issued a classified bibliography of all papers indexed at the bureau in the years 1931 to 1934. It was the fullest index of soil literature covering those years available and was well received. In 1938 the bureau issued a second volume (price 25*s*. 0*d*.) covering all references indexed in 1934 to 1937. Research institutes and libraries therefore who obtain these two volumes entitled " Bibliography of Soil Science, Fertilizers and General Agronomy 1931 to 1934 and 1934 to 1937 " have at hand in convenient form a fully classified index covering the eight years 1931 to 1937. For 1938 there is the abstract journal, " Soils and Fertilizers."

The bureau of Animal Health has under preparation a classified index covering all its literature on nutrition. Each such index will cover a five year period.

F. *The Forestry Bureau*

22. As explained in last year's report no definite step towards establishing this new bureau could be taken until Oxford University had reached a decision on the recommendations of a Committee which had been appointed in 1937 to report on the position of the Forestry School in the University. The bureau started in October, 1938, under Mr. J. N. Oliphant, C.M.G., the Director of the Imperial Forestry Institute. A start was at once made on examining and indexing forestry literature and the first number of Forestry Abstracts was issued in June, 1939. Great credit is due to Mr. Oliphant for this. Meanwhile a Deputy Director, Mr. J. W. B. Sisam from Canada had been selected.

Close touch was kept throughout with the Empire Forestry Association ; and with the Standing Committee on Empire Forestry. The assistance of both these bodies has been greatly appreciated. Prominent members of

both assisted the Executive Council in selecting the Deputy Director, and the Empire Forestry Association both advertised the post and kept its members informed about the new bureau.

23. It is particularly unfortunate that the enthusiastic and capable help of Mr. J. N. Oliphant was not for long available. His contract with the University expired in July, 1939, and he has accepted the post of Chief Conservator of Forests in Nigeria. He stayed long enough, however, to start the work of the bureau on sound lines. The Executive Council found his aid invaluable during a difficult period. On Mr. Oliphant's departure, the Professor, Mr. R. S. Troup, C.M.G., C.I.E., was to assume charge of the post of Director of Imperial Forestry Institute in addition to his professional duties. He was unfortunately then in bad health, which, to the great regret of the Council and of his friends has ended fatally. Dr. L. Chalk, Ph.D., on the Institute's Staff has been acting as Director since Mr. Oliphant left.

G. *Bureaux Accounts*

24. During the year (1938–39) the Executive Council were informed that the Governments of India and Burma had agreed that with effect from 1st April, 1937, the Government of Burma would undertake responsibility for 10 per cent. of the contributions shown in the report of the British Commonwealth Scientific Conference against India and Burma as a whole. As no payments had been made by Burma in the years 1937–38 and 1938–39 pending the conclusion of the discussions between the two governments, the Government of Burma informed the Executive Council that it would provide the total sum due from it for the five-year period 1st April, 1937, to 31st March, 1942, in the three equal payments in the three financial years 1939–40 to 1941–42. It was stated that similar arrangements would apply to the contributions to the Imperial Institute of Entomology, the Imperial Mycological Institute and the Farnham House Laboratory.

The Anglo-Egyptian Sudan has been a member of the Bureaux scheme since its start in 1929, having then undertaken to provide as its contribution one-eightieth of the annual estimated cost. When in 1937–38 it became clear that the governments of the Empire had accepted their respective shares of the increased sums recommended by the British Commonwealth Scientific Conference, the Government of Anglo-Egyptian Sudan was so informed and was asked whether it would increase its contributions proportionally with effect from the Council's financial year (1938–39). This proposal was accepted.

25. The audited statements are attached. The total contributions for the ten bureaux attributable to the year 1938–39 were £27,210 18*s*. 9*d*. Arrears of £501 15*s*. 5*d*. were also outstanding on 31st March, 1938 (*see* para. 6 of previous year's report). Of these arrears that on the Indo-Burma contribution (£271 5*s*. 0*d*.) is being paid under the arrangements outlined above leaving a balance of arrears of £230 10*s*. 5*d*. payable in 1938–39.

On the other hand, as pointed out in the previous year's report, it had not been possible to start the Imperial Forestry Bureau in 1937–38 and contributions received in that year for that purpose—viz., £1,446 18*s*. 0*d*. (£900 from the United Kingdom and Dominions and £546 18*s*. 0*d*. from the Colonies) were carried forward as prepayments towards contributions in 1938–39. The Colonial Office, however, stated that it would prefer for its sums to remain in the Council's accounts for final adjustment at the close of the five-year period.

26. The reconciliation between the amount normally attributable to the year 1938–39, viz., £27,210 18*s*. 9*d*. and £26,034 12*s*. 5*d*. actually received is as follows :—

	£	*s*.	*d*.
Sum attributable to the year	27,210	18	9
Add arrears outstanding on 31st March, 1938, and payable in 1938–39	230	10	5
	27,441	9	2
Deduct £900 being prepayments on account of forestry for 1938–39	900	0	0
Amount due in 1938–39	£26,541	9	2

The amount received in the year was £26,034 12*s*. 5*d*.

	£	*s*.	*d*.
Received in the year as contributions	26,034	12	5
Deduct excess payments by the Colonies, viz., 10*s*. on the year and a further £15 12*s*. 0*d*. for forestry for 1937–38 ..	16	2	0
Amount received towards amount due in 1938–39	26,018	10	5
Leaving a balance outstanding of	522	18	9
	£26,541	9	2

This £522 18*s*. 9*d*. is due from Australia being £54 3*s*. 9*d*. referred to in para. 6 of the previous year's report and £468 15*s*. 0*d*. (Forestry) due for 1938–39.

27. Net expenditure was £26,959 5*s*. 1*d*. which was slightly less than the total of the contributions "attributable to the year." This was due to

(*a*) the senior posts (Deputy Directors) at three bureaux, Animal Genetics, Forestry and Animal Nutrition being vacant for large parts of the year;

(*b*) the first number of the Journals from the bureaux of Dairy Science and Forestry only appearing in 1939–40; and

(*c*) an increase in receipts from sales of publications owing mainly to the revision in rates of subscription made in the previous year.

28. Receipts from sales of publications over the last seven years.

a. *Receipts from sales of publications*

——	1932–33	1933–34	1934–35	1935–36	1936–37	1937–38	1938–39
	£	£	£	£	£	£	£
Soil Science	57	73	103	404	276	306	600
Animal Health	735	1,161	1,328	1,287	1,373	1,293	1,166
Animal Nutrition	54	22	16	20	12	29	25
Animal Breeding and Genetics	12	79	151	160	156	229	294
Horticulture and Plantation Crops	61	115	126	160	151	241	373
Pastures and Forage Crops	54	83	136	208	217	444	521
Plant Breeding and Genetics	77	123	128	131	268	258	314
Agricultural Parasitology (Helminthology)	15	18	22	353	295	364	316
Dairy Science	—	—	—	—	—	—	5
Forestry	—	—	—	—	—	—	3
Headquarters	15	5	13	4	46	2	17
Total	1,080	1,679	2,023	2,727	2,794	3,166	3,634

b. *Nutrition Abstracts and Reviews*

Nutrition Abstracts and Reviews	840	841	973	1,168	1,920	1,902	2,070
Gross total	1,920	2,520	2,996	3,895	4,714	5,068	5,704

The Medical Research Council of the United Kingdom and the Trustees of the Reid Library, Aberdeen, contribute to the production of Nutrition Abstracts and Reviews and are represented on its Managing Committee. The accounts of that Journal are accordingly kept separate from the Council accounts and are separately audited. Hence they are shown separately in the table above.

29. The figures given above include receipts from all sales, whether of journals or of occasional or technical communications, though those from the journals are the more important.

H. *The Imperial Institute of Entomology*

30. Dr. S. A. Neave, O.B.E., the Assistant Director in charge of the Publication Branch, was unfortunately ill for some months. He re-assumed charge before the end of the year.

As has been mentioned in former reports the need for increased accommodation has been a difficulty for some years. During the year expert surveyors reported that the ever increasing weight of books was endangering the safety of the building. It will readily be understood therefore how greatly the Executive Council appreciates the help of the authorities of the National History Museum for accommodating in the basements of the Museum much of the Institute's stock of publications and part of its library.

31. Sir Guy Marshall's report is printed as Appendix I.

The usual statistical statement of identification work is as follows :—

	1933–34	1934–35	1935–36	1936–37	1937–38	1938–39
Collections received for identification						
Number of senders	181	220	207	193	215	193
Number of specimens	106,700	80,733	101,728	116,783	108,179	85,460
Identifications made						
Number of lists issued	386	343	359	348	393	406
Number of names therein ..	8,287	9,401	7,270	7,767	8,517	9,945
Number handed to the British Museum after identification	50,300	15,200	40,500	39,200	16,091	23,796
of which new to science ..	470	348	414	292	434	252
of which, in addition to those, no named specimens were in the National Collection	833	739	614	439	914	824

In addition 210 named specimens were presented to Edinburgh University and to the Department of Agriculture, Iraq.

Although receipts for identifications fell off somewhat it will be seen that the identifications made exceeded those in any previous year. The countries to which the largest numbers of identifications were sent were India and Burma (1,052), Fiji Islands, Uganda, and Kenya (each between 600 and 650), Malaya and Palestine (between 500 and 550 each), the West Indies (404) and Southern Rhodesia, the United Kingdom, Australia and New Guinea, the Anglo Egyptian Sudan, the Union of South Africa between 300 and 400 each. As usual thousands of specimens were returned after naming to those who had sent them.

32. *Publications.*—The regular publications of the Institute are :—

Review of Applied Entomology—Series A. Agricultural.
Review of Applied Entomology—Series B. Medical and Veterinary.
Bulletin of Entomological Research.
Zoological Record—Part Insecta.

The first two form the abstract journals and appear monthly. The figures given below relate to its 26th volume, that for 1938. The Bulletin contains original papers, appears quarterly and those issued in 1938 made its 29th volume. The Zoological Record—Part Insecta has for many years been prepared by the Institute under arrangements with the Zoological Society of London, which contributes £100 from its "Zoological Record" Fund to the cost of its preparation. The volume issued in the year was the 74th of the series and covered the literature for 1937.

33. The number of subscribers to series A of the abstract journal (the Review of Applied Entomology) rose from 603 to 637, and those to series B from 442 to 464. The numbers of subscribers to the Bulletin remained unchanged at 386 and to the Record increased by 2 to 136. Five years previously (1933) the number of subscribers were, 528, 412, 362 and 118 respectively.

Although the number of subscribers in 1938 exceeded those in 1937, the total receipts from sales of these publications fell by £247 17*s.* 2*d.*, owing to smaller sales of back numbers.

34. *Other Publications.*—31 copies of Mr. T. H. C. Taylor's book "The Biological Control of an Insect in Fiji" (*see* last year's report) and 15 of Dr. B. P. Uvavov's book on "Locusts and Grasshoppers" were sold in the year.

By far the chief additional work was the progress made in "Nomenclator Zoologicus." The first volume was published in July, 1939, and the second of the three volumes which would complete the work should normally be ready early in 1940.

35. As usual Sir Guy Marshall's report (Appendix I) gives some samples of the enquiries dealt with during the year. Reference is requested to that list to see their variety and the wide range of countries from which they come.

36. *Accounts.*—£110 of contributions from Empire Governments due for the year 1937–38 was outstanding on 31st March, 1938, viz., from the Bahamas £50 and on the Indo-Burma contribution (£60) (*see* paragraph 38, last year's report). The arrears from Bahamas (£50) was received in 1938–39. The £60 on the Indo-Burma contribution as well as the like sum due for 1938–39 is being liquidated during the three years 1939–40 to 1941–42 (*see* paragraph 42 above).

Total normal annual contributions from Empire Governments is £13,442 a year, reduced for 1938–39 to £13,382 owing to the arrangements by which Burma is making its five-year contributions in three equal instalments from 1939–40—1941–42.

The sum received in the year from Empire Governments by way of contributions was £13,356 19*s.* 0*d.* (*see* audited statement attached). The reconciliation between these two figures is as follows :—

	£	*s.*	*d.*
Due on account of 1938–39	13,382	0	0
Add : (i) arrears outstanding on 31st March, 1938	50	0	0
(ii) sums received but not passed through accounts on 31st March, 1938	427	7	0
Total due in 1938–39	13,859	7	0
Sum received, *see* audited account	13,356	19	0
Amount outstanding on 31st March, 1939	£502	8	0

The sum of £502 8*s.* 0*d.* was due from Australia and was received in April and May, 1939.

I. *Imperial Mycological Institute*

37. The work of the Institute continued under its three main headings (i) investigation, (ii) identification and (iii) the collection and dissemination of information (*see* the Director's report, Appendix II).

Requests for assistance in identification which had been increasing for some years were yet more numerous in 1938–39. They were especially so from Canada, India, Australia (Queensland), the Union of South Africa, Southern Rhodesia, Uganda, Sierra Leone, Cyprus and Mauritius. In his report the Director instances several of the more interesting identifications.

38. Every indication points to increasing and wider use of this service of identification. Fortunately, the means at the disposal of the Institute for rendering such help is steadily improving in two ways. " Investigational " work takes time but its results are accumulating. Also the herbarium, with its collection of named specimens is growing each year, due not only to the work of those in the Institute but to gifts from other plant pathologists. In his report the Director acknowledges with thanks gifts of named collections from Mr. F. C. Deighton of Sierra Leone and Mr. C. G. Hansford of Uganda. All such gifts increase the facilities at the Institute for the service to plant pathologists.

39. The Executive Council again acknowledges the help given to the Institute by Mr. T. Petch, Mr. R. H. Bunting, Dr. H. W. Wollenweber, of Berlin, Dr. H. W. Gordon, of Winnipeg, and Mr. H. Sydow, of Berlin, in identifying specimens.

40. *Publications.*—In addition to papers issued by the Institute the scientific officers frequently assist, and always have done so, with the preparation of books or papers (often lists of fungi) issued by the appropriate authority in an Empire country. In the year under report the National Research Council in Canada issued in book form an annotated list entitled

" The Fungi of Manitoba and Saskatchewan." It recorded 2,761 species. Dr. Bisby, who before he joined the Institute, was Professor of Pathology at Winnipeg University was the chief author.

The staff of the Institute also checked the " Fungi of India, Supplement I " by Mr. B. B. Mundkur before its publication by the Imperial Council of Agricultural Research, India.

The systematic accumulation of information in a centre such as the Institute peculiarly fits it to give this kind of help.

41. The Review of Applied Mycology was in its 17th volume. Sales were well maintained. The number of subscribers showed little change but there was a good demand for back numbers. Total receipts for the first time in the history of the Institute exceeded £1,000.

General enquiries were well up to average.

	1935–36	1936–37	1937–38	1938–39
Letters despatched (excluding those connected with the Review)	1,713	1,630	1,915	1,884
Of which replies to specific requests for information	600	500	700	670
Requests and books loaned	114	166	155	242

42. *The Imperial Mycological Conference.*—Every fifth year since 1924 an Imperial Mycological Conference has been held, at which the work of the Institute is reviewed, its future activities considered and discussions on scientific subjects of interest to Empire countries are held. The fourth such Conference falls due in 1939. In the year under report governments were addressed and their approval and support was given for this Conference to take place in London in September, 1939. All the arrangements made had, however, to be cancelled owing to the outbreak of war on the 3rd September, 1939.

43. *The Director.*—It is premature to speak of the work of the Director, Mr. S. F. Ashby, but he will reach the age for retirement towards the close of 1939. The Executive Council decided, when that occurs, to promote Dr. Wiltshire, the Assistant Director and in the vacancies thereby caused to promote Mr. Dade and Dr. Bisby. All of these have high standing as mycologists. Dr. Wiltshire has been in the Institute since it was started, and the standing and excellence of the Journal are largely due to his labours. Both Mr. Dade and Dr. Bisby, before joining the Institute, had had much experience of mycological work overseas, on the Gold Coast and in Canada respectively.

44. *Accounts.*—£510 of contributions from Empire governments due for 1937–38 was outstanding on 31st March, 1938 (*see* para. 45 of report for 1937–38)—£50 from the Bahamas, £400 from Nigeria and £60 on the Indo-Burma contribution.

This last £60 as well as the same sum for 1938–39 is being paid over the three years 1939–40 to 1941–42 (*see* para. 24 above).

Total annual contributions from Empire governments are £7,900 reduced for 1938–39 to £7,840 owing to the arrangement by which Burma is to make its five-year payments in the three years 1939–40 to 1941–42.

The sum received in the year from Empire governments by way of contributions was £8,405 6*s*. 0*d*.

The reconciliation between these two sets of figures is as follows :—

	£	*s*.	*d*.
Contributions due for 1938–39	7,840	0	0
Add (i) arrears outstanding on 31st March, 1938	450	0	0
(ii) sums received before but not passed through accounts by 31st March, 1938 (*see* para. 45 of report, 1937–38)	210	0	0
Total due in 1938–39	8,500	0	0
Amount received	8,180	6	0
Amount outstanding on 31st March, 1939	£319	14	0

This sum of £319 4*s*. 0*d*. was due from Australia and was received during April and May, 1939.

A copy of the audited accounts is attached.

J. *Farnham House Laboratory*

45. The Laboratory was visited during the year by Dr. Arthur Gibson, Dominion Entomologist of Canada, Dr. A. J. Nicholson, Chief of the Federal Entomological Service of the Commonwealth of Australia, Mr. J. Muggeridge, Chief Entomologist of New Zealand. All stayed some time in England, and discussed in detail with Dr. Thompson the work which the Laboratory should undertake for their respective countries. These visits were very valuable, and either led to or established certain changes in the work or arrangements hitherto in force.

As a result of the exceptionally large supplies sent to Canada in 1936/37 (over 21 million specimens in one year) Dr. Gibson confirmed with Dr. Thompson the proposal previously made that the Laboratory should for the time being concentrate on other parasites, leaving for the time those which had been so amply sent.

Since the early days of the Institute two Australian Entomologists have been working at the Laboratory on Australian projects and under Australian control. A rent of £100 a year was paid to the Laboratory for the facilities provided. As a result of Dr. Nicholson's visit one of these was transferred to Le Lavandou in South France, with the arrangement that Dr. Thompson would visit him from time to time. Arrangements were made whereby with effect from July, 1939, the Australian work would be placed on the same basis as that for other contributing countries.

As a result of Mr. Muggeridge's visit the work for the ensuing year was worked out; and several difficulties which had arisen were cleared.

Three Indian Entomologists worked in the Laboratory for varying periods.

In addition, a very valued visit was paid to the Laboratory by Mr. L. A. Strong, Chief of the Bureau of Entomology of the United States Department of Agriculture. Three American Entomologists at work in Europe on Spruce Sawfly—one of those for which much work has been done by the Laboratory for Canada—called at the Laboratory.

46. The number of shipments made in the year slightly exceeded those in 1937/38, but the number of specimens shipped was far lower than in any of the previous four years. This was due to two reasons :—

(i) changes in the parasites demanded (*vide* previous para. 45); and

(ii) the conditions in Czechoslovakia.

The spring of 1938 was very late and severe in the forests of Czechoslovakia. Supplies of parasites of the required kinds were difficult to find. Later when some had been found the political conditions made it very difficult to obtain the necessary labour. As in past years very great assistance has been received from the Czechoslovakian authorities and Entomologists, but it can be easily understood that the conditions prevailing in August and September, 1938, were not favourable for travel and work in the forest regions bordering on Germany, from which the requisite parasites had been obtained in great numbers in the past. Dr. Hardy remained at this work as long as he could, but on 14th September the Executive Council recalled him. He left the country only a day or two before the frontiers were closed.

47. The number of shipments and number of beneficial parasites despatched compare as follows with those in previous years.

	No. of shipments.	No. of parasites sent.
		Million.
Six and a half years from the beginning of the Laboratory to 30th September, 1933	304	1·85
Six months October, 1933, to March, 1934	45	0·78
1934–35	166	5·30
1935–36	116	3·13
1936–37	182	22·34
1937–38	100	4·56
1938–39	110	0·49

Shipments were made to the United Kingdom, Canada, Australia, New Zealand, India, Kenya, Ceylon, Mauritius and Malta. The Director's report (Appendix III) contains particulars of the chief parasites sought and the reasons therefor. Usually the Laboratory collects directly the parasites

required. But its contacts with other similar laboratories enables it to obtain and pass on parasites outside its range for collection. Thus Kenya required consignments of Leptomastix dactylopii for test in the control of Coffee Mealy bug. Stocks were obtained from the Parasitic Laboratory at Belleville, Canada and bred on at Farnham House. Three consignments comprising 2,700 specimens were sent to Kenya.

University Recognition of the Laboratory

48. During the year the Laboratory has been recognized by the University of London as one at which students preparing for the advanced degrees of the University can work. This is an advantage both to the Laboratory and to students specializing in biological control of insect pests.

Finance

49. Contributions from Empire Governments amount normally to £5,075. Of this amount £60 is due from Burma under the Indo-Burma arrangements. As in the previous cases this annual sum over the five-year period is being provided in three equal instalments in the years 1939–40 to 1941–42. The sum due as contributions in 1938–39 was therefore £5,015. The sum received was £5,223 11*s.* 9*d.* The reconciliation is as follows :—

	£	*s.*	*d.*
Sum due on account of 1938–39	5,015	0	0
Add on account of 1937–38—			
(i) received but not cleared on 31st March, 1938	214	17	11
(ii) outstanding on 31st March, 1938	3	13	10
Total due in 1938–39	5,233	11	9
Sum received in 1938–39	5,233	11	9

A sum of £12 10s. due from Australia for 1937–38 was still outstanding.

50. The financial position of the Laboratory since the Executive Council became responsible for its general administration is as follows :—

Receipts

Period	Expenditure	Contributions	Fees for special work	Sales and Miscellaneous	Total Receipts	Balance on year
	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
6 months, Oct., 1933 – Mar., 1934 ..	1,353 19 2	Nil	105 5 6	Nil	105 5 6	– 1,248 13 8
1934–35 ..	5,046 19 5	5,035 0 0	322 15 6	127 16 3	5,485 11 9	+ 438 12 4
1935–36 ..	5,237 9 11	5,035 0 0	831 1 8	156 15 1	6,022 16 9	+ 785 6 10
1936–37 ..	5,624 4 6	5,009 7 6	1,024 14 6	111 8 3	6,145 10 3	+ 521 5 9
1937–38 ..	5,453 0 7	4,809 10 9	1,914 12 11	124 8 0	6,848 11 8	+ 1,395 11 1
1938–39 ..	5,735 3 0	5,233 11 9	1,542 6 3	139 13 5	6,915 11 5	+ 1,180 8 5

Expenditure in 1938–39 was higher than in the previous year, due mainly to increases in salaries (£212) and replacements of laboratory equipment (£77). Receipts from fees for special work were £372 less than in 1937–38.

As stated in the report for 1937–38 the debt hanging over from the period October, 1933, to March, 1934, was liquidated in that year out of accumulated balances.

The Executive Council has also informed governments that as a particular measure the contributions due for 1939–40 can be reduced by 20 per cent. This means a reduction of £1,015 in the contributions expected for the current year. Whether it can be repeated depends on the amount of work sent in to the Laboratory and the fees earned thereon.

51. The audited statement is attached. Dr. Thompson's report is given in Appendix III.

K. *The Potato Expedition*

52. Very great progress was made in the year. Reference is requested to Appendix V which contains a short summary by Dr. Hudson of the events to the beginning of April, 1938, and a report by Dr. R. J. Salaman, F.R.S., on the work at Cambridge during 1938–39. The Executive Council cannot speak too highly of the assistance it has received from Dr. Salaman. Without his interest and knowledge and the administrative help of Professor Engledow this difficult material would not have been handled as it has been.

53. By April, 1938, Mr. Balls had started for Mexico. Dr. Salaman in particular and other scientists interested in this work pointed out that tubers did not carry easily, that in any case much of the material would have to be grown on before there would be sufficient for general distribution to Empire countries, that many of the samples received, though collected from different places would be identical, which could not be determined without scientific examination during the process of "growing on," that in any case such "growing on" should be under careful skilled control both to notice and safeguard against the introduction of disease and also to prevent any of the specimens from becoming infected with disease.

54. The arrangements reached were briefly referred to in the last report and the scientific precautions taken as a result of them are set out fully in Dr. Salaman's report. Dr. Güssow, the Dominion Botanist in Canada also happened to be in the United Kingdom at that time and the scientific and other arrangements were discussed between him and Dr. Salaman. Two insect proof greenhouses at Cambridge, in one of which conditions of light could be controlled, were prepared and specially allotted to this work. These needed extensive alterations and entailed much work at Cambridge. The Executive Council agreed to meet the cost of adopting one greenhouse and to contribute towards maintenance costs for a time. A very important point was the drawing up of a detailed scheme for recording on an agreed and constant form the taxinomic characters of the material collected.

55. Mr. E. K. Balls, who in 1938 was on a botanical expedition to Mexico with Dr. Gourlay, undertook in return for a very small contribution to his costs, to send samples of Mexican potatoes. On conclusion of his Mexican tour Mr. Balls went to Ecuador and Colombia. Mr. J. G. Hawkes, who meantime had been sent to Russia, to see the Russian collection and Russian work, left England in December to meet Mr. Balls in Peru. They have then worked over the Peruvian Andes and are due to return via Ecuador. Mr. Hawkes left for England on 31st August, 1939.

56. The material collected at Cambridge comes from four sources :— (i) that brought back by the Percy Sladen expedition of 1937 from the neighbourhood of Lake Titicaca and presented by it to the Council; (ii) a gift by the Russian government following the visits to Russia of Dr. Hudson and Mr. Hawkes; (iii) material collected in Mexico by Mr. Balls and Dr. Gourlay and (iv) that collected by Mr. Balls and Mr. Hawkes in the Andes. Dr. Salaman is certainly right in describing the collection " as already probably one of the biggest of its kind in the world."

Up to that date Dr. Salaman estimated that some 10,000 tubers had been received and examined and he considers that the collection contains some 400 different varieties and species.

Consignments of this new material have been sent to Scotland, Canada, Australia, New Zealand, Eire, Jamaica, Ceylon and Malaya. It would have also been sent to South Africa had not the authorities there stipulated on receiving seed, not tubers.

57. As originally planned the purpose of the expedition was to collect the material and distribute it as quickly as possible round Empire countries. On those lines every receiving country would have received numbers of bags of tubers identified only by numbers and accompanied with the sketchiest descriptions. Many would have proved to be duplicates and all receiving countries would have to have done the same laborious scientific examination to discover what they had received. It is due to Dr. Salaman, Professor Engledow and Dr. Güssow that use has been made of the need for multiplying the samples received to enable distribution, to subject the samples to careful scientific examination and identification. Plant Geneticists are therefore receiving the samples with fairly full descriptions and much essential preliminary scientific work done. Dr. Salaman has given freely much time and thought to this work. The Executive Council is greatly indebted to him. He is retiring under the age limits in September, 1939, and one of the immediate anxieties of the Council is to find funds to enable this work to go forward in the way it has been started. The combination of this work of identification with that of multiplication is an economy for every receiving country in saving time and labour of their scientists which would otherwise have been unavoidable.

As it is, some countries have suggested informally that distributions to them should be confined to varieties possessing certain genetical properties

which they desire. This would require a much longer programme of scientific work. Such suggestions as well as those on the advisability of maintaining the collection, go beyond the conception and the limit of the funds provided. They are of the type which could only be considered properly at a general Scientific Conference.

The views of Dr. Salaman on the potential scientific and economic value of this collection of potatoes are given in the concluding paragraphs of his report. (*See* Appendix V.)

Finance.

58. The full amount of contributions as agreed between governments, viz., £2,050, had been received before the close of the year. Including the imprest which had been given to Mr. Balls and Mr. Hawkes £1,490 18*s.* 9*d.* had been disbursed by 31st March, 1939.

L. *The Research Schemes*

59. As explained in para. 77 of the report for 1937–38 no contributions had been paid at the time for the six months October, 1933, to March, 1934, towards the various research schemes continued by governments on a co-operative basis. As also stated in that paragraph by 31st March, 1938, the debt on Farnham House Laboratory had been paid out of accumulated balances and for the others all governments except New Zealand had provided their shares which had been paid over. During 1938–39 £1,500 for Low Temperature and £31 5*s.* 9*d.* for Research into Insect Infestation of Stored Products, being the amounts due from New Zealand, were received and paid over. All the arrangements made for those six months following the close of the Empire Marketing Board have been now completely carried through.

60. The two schemes to which governments contribute are Low Temperature Research and Wool Research, Torridon. The sums due in 1938–39 from the several governments for these two schemes were :—

	£
A. Low Temperature Research :	
Australia	1,875
New Zealand	2,000
Union of South Africa	850
Southern Rhodesia	50
Total	£4,775

B. Wool Research, Torridon :	£
Australia	1,000
New Zealand	300
	£1,300

These sums were received before 31st March, 1939 and paid over, as well as £1,000 from Australia for Wool Research outstanding on 31st March, 1938 for the year 1937–38.

M. *Personal.*

61. The Executive Council were pleased to see during the year that several of the Directors of Institutes at which bureaux are located received national and scientific recognition. Thus Sir George Stapledon was knighted and was elected a Fellow of the Royal Society; Professor F. A. E. Crew was elected a Fellow of the Royal Society; Mr. J. N. Oliphant was made a Companion of the Order of St. Michael and St. George.

F. J. DU TOIT,
Chairman.

EXECUTIVE COUNCIL, IMPERIAL AGRICULTURAL BUREAUX.

Account of Receipts and Payments for the Year ended 31st March, 1939.

Receipts.

	£	s.	d.	£	s.	d.
Balance on 1st April, 1938:—						
General Account ..	1,628	8	9			
Potato Expedition Fund	687	16	6			
Contribution from Colonial Medical Fund	25	17	6(*a*)			
				2,342	2	9
Contributions from the Governments of the Empire, etc., to :—						
(*a*) Imperial Agricultural Bureaux ..	26,041	7	5			
Less refund to Canada	6	15	–			
				26,034	12	5
(*b*) Various Institutes, etc.	15,320	17	7			
Less paid over ..	15,320	17	7			
				–	–	–
Dividends and Interest				557	14	10
Conversion of Stock :						
£2,000 South Australia (1939) 3½% Inscribed Stock				1,940	4	–
Potato Expedition to South America :						
Contributions	1,250	–	–			
Less expenditure ..	727	–	8			
				522	19	4
Post Office Savings Bank (net withdrawal)				337	15	2
				£31,735	8	6

Payments.

	Gross Expenditure.			*Less* Receipts from Sales of Publications, etc.			Net Expenditure.					
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Expenditure incurred by the Imperial Bureau of :—												
Soil Science (Rothamsted)	3,524	5	2	600	6	5	2,923	18	9			
Animal Nutrition (Aberdeen)	2,891	8	8	24	12	8	2,866	16	–			
Animal Health (Weybridge)	6,126	15	–	1,166	1	–	4,960	14	–			
Animal Breeding and Genetics (Edinburgh) ..	2,353	8	7	293	19	8	2,059	8	11			
Horticulture and Plantation Crops (East Malling) ..	2,577	16	9	373	–	2	2,204	16	7			
Pastures and Forage Crops (Aberystwyth)	3,460	6	3	521	2	10	2,939	3	5			
Plant Breeding and Genetics (Cambridge) ..	3,276	7	4	313	19	8	2,962	7	8			
Agricultural Parasitology (Helminthology) (St. Albans)	2,098	8	8	316	9	3	1,781	19	5			
Dairy Science (Shinfield) ..	1,081	–	2	4	10	–	1,076	10	2			
Forestry (Oxford)	618	15	1	2	13	–	616	2	1			
Secretariat	2,584	17	10	17	9	9	2,567	8	1			
										26,959	5	1
Conversion of Stock :												
£2,000 Commonwealth of Australia 4% Registered Stock 1955–70 ..										1,940	4	–
Balance on 31st March, 1939:												
							£	s.	d.			
Paymaster-General							1,053	16	2			
Less outstanding orders							60	17	–			
							992	19	2			
Directors' Balances							975	13	6			
E. K. Balls' Balance (on a/c Potato Exped.)							651	14	7			
							2,620	7	3			
Add Suspense Accounts							215	12	2			
										2,835	19	5(*b*)
										£31,735	8	6

(*a*) Transferred to General Account during year.

(*b*) Includes £1,210 15*s*. 10*d*. held on behalf of Potato Expedition to South America.

Investments on 31st March, 1939 :—	£	s.	d.
£4,000 5% Conversion Loan 1944/64 at cost	4,152	16	–
£2,000 4% Commonwealth of Australia Registered Stock 1955/70 at cost	1,940	4	–
£4,000 3% Commonwealth of Australia Registered Stock 1939/41 at cost	3,959	14	6
Post Office Savings Bank	4,985	6	10

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct. (*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

(*Signed*) W. G. IVES,
Accountant.

(*Signed*) DAVID CHADWICK,
Secretary.

Executive Council, Imperial Agricultural Bureaux.
28*th July*, 1939.

IMPERIAL INSTITUTE OF ENTOMOLOGY.

Account of Receipts and Payments for the year ended 31st March, 1939.

Receipts.

	£	s.	d.	£	s.	d.
Balance on 1st April, 1938				6,810	11	7
Contributions from :—						
Empire Governments	13,356	19	–			
Foreign Governments	474	12	2			
Societies	200	–	–			
				14,031	11	2
Interest and Dividends				505	19	5
Sales of Publications				2,443	10	10
				£23,791	13	–

Payments.

	£	s.	d.	£	s.	d.
Salaries, Director, etc.				2,400	–	–
F.S.S.U. contributions				240	–	–
Salaries, Scientific staff				7,273	4	10
F.S.S.U. contributions				688	5	–
Salaries, whole time staff				2,508	16	5
F.S.S.U. contributions				218	13	4
Salaries, part time staff				29	–	11
National Insurance				14	16	5
Travelling expenses				22	16	5
Books, Publications				188	5	7
Bulletins				1,759	16	1
Stationery, Postage and Telephones				136	14	11
Rent, Rates, Insurance				351	17	9
Housekeeping, Light, Heat, Water, Cleaning				324	4	10
Laboratory Equipment				9	16	6
Contingencies				27	6	1
Furniture				2	5	1
Audit Fee				25	–	–
				16,221	–	2
Balance on 31st March, 1939 :—						
Sir Guy A. K. Marshall	24	1	3			
Joint Colonial Fund	6,500	–	–			
Crown Agents for the Colonies	746	17	3			
H.M. Stationery Office	200	–	–			
F.S.S.U. Suspense	100	2	11			
	7,571	1	5			
Less Widows' and Orphans' Insurance Employees' contributions		8	7			
				7,570	12	10
				£23,791	13	–

		£	s.	d.
Investments on 31st March, 1939:				
£1,040 5 2	Queensland 1922/47 Stock 3% at cost ..	1,000	–	–
£1,000 – –	Cyprus 1956/66 Stock 4% at cost ..	950	–	–
£2,679 19 –	Funding 1960/90 Stock 4% at cost	1,869	12	6
£1,000 – –	Jamaica 1952/62 Stock 4% at cost	940	–	–
£1,017 16 8	Kenya 1961/71 Stock 4½% at cost ..	998	15	–
£1,000 – –	India 1950/55 Stock 4½% at cost ..	936	7	–
£1,000 – –	Nigeria 1963 Stock 4% at cost ..	881	7	–
£8,738 – 10		£7,576	1	6

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct.

(*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

(*Signed*) GUY A. K. MARSHALL, *Director.*
(*Signed*) W. G. IVES, *Accountant to Council.*
(*Signed*) DAVID CHADWICK, *Secretary,*
Executive Council, Imperial Agricultural Bureaux.

5th July, 1939.

IMPERIAL MYCOLOGICAL INSTITUTE, FERRY LANE, KEW, SURREY.

Account of Receipts and Payments for the Year ended 31st March, 1939.

Receipts.

	£	s.	d.	£	s.	d.
Balance on 1st April, 1938				2,473	6	6
Contributions from :—						
Empire Governments	8,180	6	–			
Foreign Governments	175	–	–			
Societies	50	–	–			
				8,405	6	–
Dividends and Interest				145	9	–
Publications				1,091	14	–
				£12,115	15	6

Payments.

	£	s.	d.	£	s.	d.
Director's salary				1,200	–	–
Superannuation				120	–	–
Scient. and Tech. Staff Salaries				4,363	9	2
Superannuation				378	6	8
Clerical Staff Salaries				772	8	4
Superannuation				34	12	–
Laboratory Attendant Salary				193	7	5
Superannuation				17	10	–
Overtime				8	4	6
National Insurance				19	1	10
Travelling				3	6	1
Purchase of books				89	9	6
Issue of Publications				900	17	9
Postage, stationery, telephone, etc.				82	6	1
Rent, rates, and insurance				110	9	–
Light, heat, water, cleaning, etc.				192	19	6
Laboratory apparatus				59	3	–
Contingencies				2	8	11
Audit				20	–	–
Equipment				13	10	6
				£8,581	10	3
Balance on 31st March, 1939						
Joint Colonial Fund	3,000	–	–			
Crown Agents	297	14	5			
Bank	166	3	5			
Cash		8	11			
Stamps	5	15	–			
F.S.S.U. Suspense Account	64	3	6			
				3,534	5	3
				£12,115	15	6

Investments on 31st March, 1939 :
£2,077 15*s.* 4*d.* New Zealand 4½% 1944 at cost £2,000

(*Signed*) S. F. ASHBY, *Director.*

(*Signed*) W. G. IVES, *Accountant to Council.*

(*Signed*) DAVID CHADWICK, *Secretary.*
8*th June*, 1939.

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct. (*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

IMPERIAL INSTITUTE OF ENTOMOLOGY, PARASITE LABORATORY, FARNHAM HOUSE.

Account of Receipts and Payments for the Year ended 31st March, 1939.

Receipts.	£ s. d.	£ s. d.
Balance on 1st April, 1938:		
General Account	1,892 2 4	
Capital Account	257 17 –	
		2,149 19 4
Contributions from Governments of the Empire		5,233 11 9
Contributions towards work on Special Projects	3,474 19 10	
Less Expenditure thereon	1,932 13 7	
		1,542 6 3
Accommodation of Australian Entomologists		100 – –
Miscellaneous Receipts:		
Sales of parasite material	29 19 5	
Interest (General Account)	9 14 –	
Interest (Capital Account)	4 8 11	
		44 2 4

Payments.	£ s. d.	£ s. d.
Directional Staff:		
Director	200 – –	
Superintendent and Assistant Director	1,200 – –	
Superannuation	141 15 9	
		1,541 15 9
Scientific and Technical:		
Assistant Entomologists	1,679 10 4	
Superannuation	171 10 –	
		1,851 – 4
Senior Clerk		342 16 7
Junior Clerk		133 2 6
Laboratory Stewards		228 18 –
Caretaker and Gardeners		383 16 5
Superannuation		61 6 10
National Insurance		17 16 10
House Maintenance		90 1 3
Laboratory Maintenance		472 9 6
Rates		84 10 10
Fuel		89 17 –
Electric Current		157 9 8
Fire and other insurances		14 16 3
Motor and Gas		3 12 10
Travelling, etc.		39 3 1
Shipments, etc.		96 1 9
Garden		11 16 7
Library		104 11 –
Audit Fee		10 – –
		£5,735 3 –

	General A/c. £	s.	d.	*Capital A/c.* £	s.	d.	£	s.	d.
Balance on 31st March, 1939:									
Crown Agents for the Colonies	424	2	9						
Less Widows' and Orphans' Employees' contributions		4	1						
	423	18	8						
Joint Colonial Fund ..	2,500	–	–	200	–	–			
Deposit with Bank Superintendent, etc.	121	3	5	62	5	11			
F.S.S.U. ..	27	8	8						
	3,072	10	9	262	5	11	3,334	16	8
							£9,069	19	8

£9,069 19 8

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct. (*Signed*) G. C. UPCOTT,
Comptroller and Auditor General.

(*Signed*) W. R. THOMPSON, *Superintendent.*
(*Signed*) W. G. IVES, *Accountant to Council.*
(*Signed*) DAVID CHADWICK, *Secretary.*
6th July, 1938.
Executive Council, Agricultural Bureaux.

APPENDIX I

IMPERIAL INSTITUTE OF ENTOMOLOGY
DIRECTOR'S REPORT FOR 1938–39

The disturbed international conditions in Europe during the past year have reacted to some extent on the activities of this Institute, principally in connection with the sales of our publications. During recent years these have been steadily rising, but last year there was a fall of £230; further, it was noticeable that the number of correspondents in Europe who sent in insects for identification was reduced from 61 to 38. But apart from this, the work of the staff was more than fully maintained.

A difficult position arose last summer in our Publication Office owing to the discovery that the ever-increasing weight of books on the upper floors might endanger the stability of the building. Thanks to the kindness of the authorities of the Natural History Museum we were able to move the greater part of the stock of back parts of our publications to the Museum and transfer the less-used books in our library to the basement, so that the upper floors were rendered safe. The removal of no less than 18 tons of publications from Queen's Gate to the Museum was most efficiently and economically carried out by Mr. S. G. Abbott, our Despatch clerk.

Identification of Insects

During the year under review the number of specimens received amounted to 85,460, as compared with 108,179 in the previous year. These insects were sent in by 193 (215) different correspondents, who were geographically distributed as follows:—Africa 59 (58), America 29 (24), Asia 44 (52), Europe 38 (61), Oceania 23 (20), all the numbers in brackets being those for the previous year.

The lists of identifications sent out totalled 406 (393), comprising 9,495 (8,517) names, these two totals constituting a record. The actual numbers of identifications sent to the various Dominions, Colonies and other territories are as follows:—

Africa	Union of South Africa	319	(156)		
	Southern Rhodesia	392	(17)		
	Sudan	328	(265)		
	Gold Coast	67	(97)		
	Kenya	627	(1,110)		
	Nigeria	88	(239)		
	Nyasaland	32	(46)		
	Sierra Leone	63	(154)		
	Tanganyika Territory	165	(86)		
	Uganda	619	(472)		
	Other Territories	604	(509)		
				3,304	(3,151)
America	Canada	72	(9)		
	West Indies	404	(265)		
	Other Territories	142	(467)		
				618	(741)
Asia	India and Burma	1,052	(955)		
	Ceylon	114	(19)		
	Cyprus	119	(149)		
	Malaya	549	(613)		
	Palestine	505	(574)		
	Other Territories	1,200	(778)		
				3,539	(3,088)

OCEANIA ..	.. Australia and New Guinea ..	356	(413)		
	New Zealand	68	(107)		
	Fiji Islands	633	(156)		
	Solomon Islands	140	(170)		
	Other Islands	26	(86)		
		—		1,223	(932)
EUROPE ..	.. United Kingdom	378	(165)		
	Other Countries	433	(440)		
		—		811	(605)

From the collections received thousands of named specimens are, of course returned to the senders; but in addition to this, 23,796 (16,091) insects have been handed over to the British Museum, of which 252 (434) were types of species new to science, and among the remainder were 824 (914) named species not previously represented in the National Collection. Some 210 named specimens were also presented to Edinburgh University and to the Department of Agriculture, Iraq.

" Review of Applied Entomology "

Dr. Neave reports that the 26th volume (1938) of the two Series of the " Review of Applied Entomology," comprised 1,030 pages (exclusive of indices) and 2,488 abstracts. These figures were in both cases rather less than those for the previous year owing, in part to ill-health and changes in the staff during the latter part of the year.

There was a further highly satisfactory increase in the number of subscribers in the case of Series " A," which rose from 603 to 637, and in the case of Series " B " from 442 to 464. Owing, however, to the international situation, there was a serious drop in the sales of back numbers, always a fluctuating figure, and this applies to all the Institute's publications. Consequently, the net cash receipts fell from £1,595 18*s.* 11*d.* in 1937 to £1,429 9*s.* 8*d.* in 1938.

" Bulletin of Entomological Research "

The 29th volume (1938) of this journal was deliberately kept rather smaller than the large volume for the previous year and contained 478 pages as against 670. It comprised 33 separate papers and was illustrated by 9 plates.

The number of subscribers remained stationary at 386 and consequently, owing to the fall in the sale of back parts and reprints, the total receipts fell from £812 0*s.* 9*d.* in 1937 to £748 13*s.* 4*d.* in 1938. On the other hand, owing to the smaller size of the volume the cost of production was materially reduced, amounting in all to £560 19*s.* 8*d.* (printing and paper £423 12*s.* 1*d.*, illustrations and maps £91 9*s.* 3*d.*, covers and postages £45 18*s.* 4*d.*), leaving a net profit of £187 13*s.* 8*d.*

" Zoological Record " Part " Insecta "

Volume 74 (literature of 1937) was a little smaller than that for the previous year, containing 3,515 titles as against 3,725. The number of subscribers rose by 2, being 136 as against 134, but owing to the fall in the sale of back volumes, the profit to the Institute, after deduction of amounts due to the Zoological Society of London, fell from £80 11*s.* 2*d.* to £62 10*s.* 8*d.*, which, however, is not far from the average of recent years.

The annual contribution of £100 was again made to the Institute out of the " Zoological Record " Fund towards the cost of preparation.

Other Publications

During the year, 31 further copies of Mr. T. H. C. Taylor's book " The Biological Control of an Insect in Fiji " were sold and 15 of Dr. B. P. Uvarov's book " Locusts and Grasshoppers."

Considerable strides were made during the year with the " Nomenclator Zoologicus," the actual preparation of which was nearly completed, though some revisionary work and much of

the heavy work of proof-reading has still to be faced. The first volume appeared early in July, 1939, and the remaining 3 volumes will probably be published at intervals of about 6 months. Each volume will contain between 900 and 1,000 pages. The Zoological Society of London again made a contribution of £50 towards the cost of supervising the preparation of this work.

General Information Service

The following are some of the enquiries dealt with during the year :—

United Kingdom.—The Air Ministry were supplied with information as to methods of protecting the silk fabric of parachutes from the attacks of Dermestid beetles.

The Naval Store, Chatham, submitted samples of damaged bamboo poles; the beetles causing the injury were identified and recommendations were made as to the best means of eradicating them.

A report was made to the Royal Gardens, Kew, on various insects found attacking imported banana plants.

Advice was sent to the Colonial Department of London University regarding the best method for protecting books against the attacks of insects in the Tropics.

Dr. A. H. Hunter was supplied with a list of the literature dealing with the rabbit mite.

Canada.—The Dominion Entomologist asked for information regarding the occurrence of parthenogenesis in sawflies of the genus *Cephus*, some of which are pests of wheat, and this was transmitted to him.

Australia.—A report was sent to the Agent-General for West Australia upon the claim made by Russian entomologists that they can destroy locusts effectively by means of bacterial disease.

Union of South Africa.—A report was made to the Empire Cotton Growing Corporation on a collection of insects made in connexion with a study of the communities inhabiting cotton and maize crops.

New Zealand.—A warning was sent to Dr. D. Miller, Cawthron Institute, that a weevil that must have been introduced from the Argentine had recently been received in several collections from New Zealand, and that this might develop into a pest; unfortunately the warning has since appeared to be justified.

In view of the unsatisfactory fertilization of red clover in New Zealand, the Government Entomologist was supplied with a statement regarding the usefulness for this purpose of various European species of bumble-bees.

India.—The Government Entomologist, Punjab, submitted a long list of various families of insects recorded from India to be checked.

Information was sent to South India regarding the Cotton-stem Weevil, and recommendations for the eradication of ants damaging flower and vegetable gardens.

Federated Malay States.—A report was sent to the Agricultural Adviser on the possibility of introducing the Amazon fly into Malaya for the control of the moth borer of rice.

Kenya Colony.—Enquiries were made on behalf of the Director of Agriculture whether synthetic substitutes for pyrethrum were being produced in this country.

A report was made on a number of insects collected from aeroplanes arriving in Kenya, and the Entomologist was advised as to any species that might possibly be of economic importance.

Gold Coast.—The damage caused by fruit-piercing moths in West Africa was discussed and an ecological investigation of the problem was recommended.

Sierra Leone.—Two flies of the genus *Stomoxys*, reported as killing cattle, were identified and information was supplied as to their probable life-histories with a view to devising measures for combating them.

Gambia.—Recommendations were sent to the Senior Medical Officer for measures to control Silverfish, which were stated to be doing damage to the extent of hundreds of pounds every year.

British Somaliland.—Suggestions were made for means of controlling moths attacking stored rice.

Palestine.—Information was sent to the Chief Plant Protection Officer regarding the distribution of the Mango Weevil; and advice was given as to the advisability of introducing a number of different plants into the country.

The Director continued to serve on the Colonial Advisory Council of Agriculture and Animal Health, and on the Committee on Locust Control and the Tsetse-Fly Committee of the Economic Advisory Council. He also served on the Lawes Agricultural Trust Committee, and on the Advisory Committee on Forest Research of the Forestry Commission, and was a member of the Consultative Committee on Insecticide Materials of Vegetable Origin of the Imperial Institute. He further attended, with Dr. B. P. Uvarov, the Fifth International Locust Conference in Brussels in August, 1938.

Locust Investigations

The seventh survey of the locust situation in Africa and Western Asia for the year 1937 has been published, and a similar survey for the year 1938 is in the course of preparation. These two surveys, as usual, include in appendices lists of papers on locusts and grasshoppers which have appeared throughout the world during the respective years.

Field investigations on locusts in Africa were discontinued and the last field entomologist, Mr. A. P. G. Michelmore, has been recalled and is preparing a final report on his investigations on the Red Locust (*Nomadacris septemfasciata*, Serv.). The first part of his report is in the press and the rest is on the point of being completed.

Experimental work in the Locust Laboratory has also been completed and the laboratory has been closed down. The authorities of the British Museum (Natural History) have agreed, however, to continue maintaining a stock of locusts to be supplied for research work at university laboratories when required.

The routine work of collecting and mapping current locust reports from Africa and Western Asia continued uninterruptedly. A study of old records of the previous outbreaks of the Desert Locust (*Schistocerca gregaria*, Forsk.) is approaching completion. An analysis of the climatic factors of breeding and migrations of the same species, is being carried out systematically. In this connexion, as well as for the study of outbreaks of other locust species, great assistance is expected from the monthly weather maps of Africa for the whole period of the present outbreak which are being prepared for the Institute by the Meteorological Office (Air Ministry).

The chief event of the year was the Fifth International Locust Conference at Brussels in August, 1938, to which the British Government submitted schemes for permanent international organizations for the prevention of locust outbreaks in Africa, as well as a summary of statistical data on the losses caused by locusts and grasshoppers throughout the world during the ten-year period 1925–34. These documents were prepared by the locust investigation staff of the Institute. The Conference accepted the British scheme with certain modifications, and it may be now confidently hoped that the permanent organization envisaged in it will come into being in the near future. According to the scheme, there will be three separate field organizations for the three main locust species, with an International Locust Committee directing their activities and administering the finances, through an International Locust Centre, which the Brussels Conference have recommended to be attached to the Imperial Institute of Entomology.

Library

Accessions during the year numbered 384 volumes and 1,103 pamphlets, and the Library now contains 10,024 bound volumes and 26,300 pamphlets.

Parts of 591 serial publications were received during the year, the countries of origin being as follows :—

British Empire :		Foreign :	
United Kingdom	53	Europe	164
Overseas	172	Africa	13
		Asia and Polynesia	38
		United States and Territories ..	127
		Central and South America ..	24

These figures are exclusive of a certain number of periodicals or reports that contain only an occasional paper on entomology.

In addition to the daily internal use of the Library by staff and by visitors, books and pamphlets issued on loan totalled 702; in addition, 50 items were lent to Farnham House Laboratory. Government Departments and scientific institutions borrowing books included :—the War Office, the Ministry of Agriculture, the Department of Scientific and Industrial Research, the National Institute for Medical Research, the Imperial Mycological Institute; the Imperial Bureaux of—Animal Health, Herbage Plants, and Agricultural Parasitology; the London School of Hygiene and Tropical Medicine, the Liverpool School of Tropical Medicine, the Royal College of Veterinary Surgeons, the Royal Entomological Society of London, Imperial Chemical Industries, the Wellcome Bureau of Scientific Research, and the National Central Library. Books were also sent on loan overseas to Canada, South Africa, India, the Seychelles, Palestine, France, Germany, Poland and Morocco.

The catalogue of serial and official publications was maintained up-to-date (in quadruplicate) and at present comprises nearly 4,000 slips, many of which contain more than one entry. The author-catalogue is up-to-date for books and separates.

During the year, it became necessary to transfer between 6,000 and 7,000 volumes to the basement, owing to the danger to the upper floors of the building arising from the ever-increasing accumulation of books. This necessarily gives rise to a highly inconvenient situation and one that is only tolerable in view of its temporary nature. As a result of it, and in view of the probable transfer of the Publication Office to the British Museum (Natural History), the cataloguing of entomological articles in serial publications has been restricted.

Visitors

The following economic entomologists came to the Institute during the year and discussed various problems in which they were interested :—Dr. A. Gibson from Canada; Dr. A. J. Nicholson, Dr. J. Davidson from Australia; J. Muggeridge from New Zealand; E. Anderssen (Virus Investigations), F. S. Parsons (Cotton pests) from South Africa; H. W. Bedford, R. C. Maxwell Darling, F. G. S. Whitfield, D. J. Lewis from the Anglo-Egyptian Sudan; E. Burtt, Dr. C. H. N. Jackson, J. Y. Moggridge, W. H. Potts, of the Tsetse Research Department, W. V. Harris from Tanganyika; C. Smee from Nyasaland; Dr. E. A. Lewis from Kenya; A. M. Gwynn, G. H. E. Hopkins from Uganda; Dr. K. R. S. Morris (Tsetse Investigations) from the Gold Coast; F. D. Golding, Dr. T. A. M. Nash (Tsetse Investigations) from Nigeria; J. C. M. Gardner from India; Dr. J. C. Hutson, C. B. R. King from Ceylon; N. C. E. Miller, H. T. Pagden from the Federated Malay States; W. H. Edwards from Jamaica; L. D. Cleare from British Guiana; and H. E. Box (*Lixophaga* campaign) from Antigua.

SCIENTIFIC PAPERS PUBLISHED DURING THE YEAR BY MEMBERS OF THE STAFF OF THE INSTITUTE

Brightwell, S. T. B.—A method of investigating membrane permeability.—Bull. Ent. Res., 14 pp.

Bryant, G. E.—New species of Chrysomelidæ (Coleoptera) from Africa.—Ann. Mag. Nat. Hist., 7 pp.

Two new injurious Phytophaga from Nyasaland (Coleopt.).—Proc. R. Ent. Soc. Lond., 1 p.

New species of Chrysomelidæ (Coleopt.) from Fiji, British North Borneo and Malaya.—Proc. R. Ent. Soc., 4 pp.

Cameron, E.—A study of the natural control of the pea moth, *Cydia nigricana*, Steph.—Bull. Ent. Res., 37 pp.

Emden, F. van.—On the taxonomy of Rhynchophora larvæ (Coleoptera).—Trans. R. Ent. Soc., 37 pp.

Ferrière, C.—Eupelmides exotiques (Hymenopt. Chalcididæ). I.—Ann. Soc. ent. France, 48 pp.
Descriptions of some African Eulophidae (Hym. Chalc.).—Bull. Ent. Res., 7 pp.
Un Leucospide (Hym. Chalcidoidea) parasite de *Calligaster* à Java.—Treubia, 3 pp.

Hardy, J. E.—*Plutella maculipennis*, Curt., its natural and biological control in England.—Bull. Ent. Res., 30 pp.
On the biological control of insect pests.—Vest Kral. Ceske Spol. Nauk, 27 pp.

Lloyd, D. C.—A study of some factors governing the choice of hosts and distribution of progeny by the Chalcid *Ooencyrtus kuvanae*, Howard.—Philos. Trans., 48 pp.

Marshall, Sir G. A. K.—New Curculionidae (Col.) from Southern Africa.—Ann. Mag. Nat. Hist., 18 pp.
New Brazilian Curculionidae (Col.).—Ann. Mag. Nat. Hist., 8 pp.
On some Oriental Cossoninae.—Arb. morph. taxon. Ent., 12 pp.
New injurious Curculionidae (Col.).—Bull. Ent. Res., 8 pp.
Three new injurious Curculionidae (Col.).—Bull. Ent. Res., 3 pp.
New Indian Curculionidae (Col.).—Ind. For. Rec., 27 pp.
New Australian Curculionidae (Col.).—Proc. R. Ent. Soc. Lond., 7 pp.
On the genus *Temnoschoita*, Chevr. (Col. Curc.).—Rev. Zool. Bot. Afr., 6 pp.
On *Elytrurus* (Col. Curcul.) and an allied genus.—Trans. R. Ent. Soc. Lond., 33 pp.

Nixon, G. E. J.—Three new Telenominae.—Ann. Mag. Nat. Hist., 9 pp.
Five new Asiatic Telenominae (Hym., Proctotrupoidea).—Ann. Mag. Nat. Hist., 10 pp.
Asiatic species of *Microphanurus* (Hym., Proctotrupoidea).—Ann. Mag. Nat. Hist., 18 pp.
Two new Oriental species of *Macrocentrus* (Hym., Brac.).—Ann. Mag. Nat. Hist., 6 pp.
Notes on the taxonomy and synonymy of *Zele*, Curtis, and *Macrocentrus*, Curtis (Hym., Braconidae).—Bull. Ent. Res., 10 pp.
A new genus of Hecabolinae and a note on the genus *Telebolus*, Marshall (Hym. Braconidae).—Proc. R. Ent. Soc. Lond., 5 pp.
A preliminary revision of the British Proctotrupinae (Hym., Proctotrupoidea).—Trans. R. Ent. Soc. Lond., 36 pp.

Thompson, W. R.—A Dipterous parasite of Mycetophilids.—Parasitology, 5 pp.

Uvarov, B. P.—New and interesting Acrididae (Orthoptera) from Mauretania.—Ann. Mag. Nat. Hist., 7 pp.
Orthoptera from Iraq and Iran.—Field Mus. Pub., Chicago Zool., 13 pp.
Mission scientifique de l'Omo. Orthoptera. III. Acrididae.—Mem. Mus. Hist. nat., Paris, 32 pp.
Ecological and biogeographical relations of Eremian Acrididae.—Mem. Soc. Biogeogr., 43 pp.
Studies in the Arabian Orthoptera. II.—Journ. Linn. Soc., 12 pp.
Locusts as a world problem.—C.R. Confer. Intern. Calamités, Paris, 7 pp.

Uvarov, B. P., and Bowman, B. M.—Economic importance of the Locust and Grasshopper problem throughout the World.—Proc. 5th Int. Loc. Conf. Brussels, 1938. App. 20, 47 pp.

Uvarov, B. P., and Milnthorpe, W.—The locust outbreak in Africa and Western Asia in 1937.—Econ. Adv. Council, Com. Locust Control, 64 pp.

UVAROV, B. P., and SLIFER, E. H.—Brunner's organ; a structure found on the jumping legs of grasshoppers (Orthoptera).—Proc. R. Ent. Soc., 5 pp.

WILKINSON, D. S.—A new species of *Apanteles* (Hym., Brac.) bred from *Carposina adreptella* attacking raspberry in New Zealand.—Bull. Ent. Res., 3 pp.

On the identity of *Apanteles circumscriptus*, Nees (Hym., Braconidae).—Proc. R. Ent. Soc., 11 pp.

A new species of *Apanteles* (Hym., Brac.) from South Africa.—Proc. R. Ent. Soc., 3 pp.

On a further two new Palaearctic species of *Apanteles* (Hym., Brac.).—Proc. R. Ent. Soc., 6 pp.

G. K. MARSHALL.

APPENDIX II

IMPERIAL MYCOLOGICAL INSTITUTE

DIRECTOR'S REPORT FOR 1938–39

As in the preceding years the work of the Institute has been concerned with (i) investigation, (ii) identification, and (iii) the collection and dissemination of information.

Investigational Work

Studies on critical genera and species of fungi received for identification, many of them being phytopathogenic, have been continued. Dr. Wiltshire's fundamental paper "The original and modern conceptions of Stemphylium" was published in June (*Trans. Brit. Myc. Soc.*, xxi, 211). The paper was distributed widely and as a consequence many specimens and cultures of species of *Alternaria* and *Stemphylium*, mostly on economic plants including cereals, have been received for further critical study. The opportunities for research have been restricted, however, by heavy calls upon his time as editor of the *Review*.

Mr. Mason has continued his studies dominantly on the imperfect fungi and has material enough for the publication of the special part of the third fascicle of List II of the "Annotated Account of Fungi received at the Imperial Mycological Institute." Help afforded to plant pathologists from the Colonies, who had brought extensive collections to the Institute to work up, occupied an appreciable portion of his time.

As sub-editor of the *Review*, Mr. Dade has not been able to give much attention to investigational work during the year. His special interest in the genus *Aspergillus* and related genera has, however, brought him an unusual number of species for identification and critical study.

Dr. Bisby, in spite of heavy calls on his time for identifications, was able to carry out a critical study of the genus *Trichoderma* and a paper on the species has been accepted for publication. This fungus has received much attention from mycologists and plant pathologists during recent years. "The Fungi of Manitoba and Saskatchewan" with a preface by H. T. Güssow, Dominion Botanist, was published in book form by the National Research Council in February. This joint annotated list of which Dr. Bisby is the main author records 2,761 species in the two Provinces.

Identification Work

Specimens and cultures of fungi, many being phytopathogenic, have been received in large numbers from all contributing countries. They have been especially numerous from Canada, India, Australia (Queensland), South Africa, Southern Rhodesia, Uganda, Sierra Leone, Cyprus and Mauritius. Among the more interesting identifications of pathogenic fungi were *Phytophthora cryptogea* from iris in England and marigold in New Zealand, *Ph. parasitica* from tomato and egg plant in Ceylon, from tomato in Bermuda and from citrus in Argentine and California, *Ph. cactorum* from strawberry in England and fruits of cotoneaster in Canada, *Pythium myriotylum* from ginger and turmeric in Ceylon and ginger in Bombay and Madras, *P. complectens* from ginger and cardamom in Madras, *P. ultimum* from potato in Canada, *P. butleri* from tobacco, chilli and papaya in Madras, *P. aphanidermatum* from pumpkin in Sierra Leone, *P. acanthicum* from passion fruit in Kenya, *Sclerotinia minor* from pyrethrum in

Kenya, *Helminthosporium maydis* from teosinte in the West Indies and *Cercospora circumcissa* from peach twigs in Cyprus.

Among the other interesting fungi were a new species of *Helotium* with a " Pullularia-like " conidial stage on rye-grass seed in New Zealand, a new species of *Entomophthora* having resting-spores with reticulate walls from the bag worm of black wattle in Natal, a new species of *Acremoniella* producing masses of aspergilliform phialophores from tung-oil in Malaya, a new species of *Monotospora* from avocado in Malaya, *Botryosporium longibrachiatum* from tomato in Britain and *Solanum seaforthianum* in Sierra Leone and *Massaria epileuca* on mulberry in India (Punjab). A rust on species of *Tephrosia* in Malaya where they are valuable cover crops proved to be *Ravenelia tephrosiicola* Hiratsuka and therefore different from the new species *Maravalia crotalariæ* Sydow on *Crotalaria* in Malaya.

As in the preceding year the Institute is indebted to Mr. T. Petch for identifications of a number of entomogenous fungi, Mr. R. H. Bunting for identifications of penicillate fungi, Dr. H. W. Wollenweber in Berlin and Dr. H. W. Gordon in Winnipeg for determinations of species of *Fusarium*, and Mr. H. Sydow in Berlin for many determinations and the loan of specimens.

During the year " The Fungi of India, Supplement 1," compiled by B. B. Mundkur was issued as Scientific Monograph No. 12 by the Imperial Council of Agricultural Research. It added over 500 species to those previously recorded (1930). The manuscript was submitted to the Institute for critical reading before publication. A revised list of Gold Coast fungi and plant diseases has been completed. Mr. F. C. Deighton, Plant Pathologist in Sierra Leone, worked at the Institute from April to August on his collections of fungi, mainly Meliolineæ and Mr. C. G. Hansford, Plant Pathologist in Uganda, on his collections of the same group from January to the end of March. Thanks mainly to the additions made by them the herbarium of the Institute has now an outstanding collection of named species of that group of tropical parasitic fungi. The permanent preparations attached to the sheets much facilitate the work of identification.

Information Service

Volume XVII of the *Review of Applied Mycology* was issued and the index to Volume XVI was published in June. As no occasional publication was issued during the year the cost of printing and distribution was restricted to the *Review ;* the amount was £902. The receipts from sales of publications was £1,092, resulting in a balance of £190. Receipts had been conservatively estimated at £960, the amount received in the preceding year, to allow for a possible falling off in subscriptions to the *Review* due to the raising of the rate effective from January, 1938. There has been, however, no very appreciable lessening in subscriptions. Receipts were increased also by a considerable demand for back volumes.

The distribution of the *Review* in March, 1939, was 933 as against 974 in March, 1938; the falling off was due mainly to a reduction in the number of free copies required by contributing countries.

Volume XVII (1938) contained 848 pages (excluding the index) the same number as volume XVI. The total number of papers abstracted was 1,858. This figure is conservative as several reports, each containing many individual papers, have been abstracted each under one title to save space without reducing the length of the individual abstracts. There was a slight lessening in the output of the literature during the latter part of the year.

There has been an increase in the demand for the occasional publications of the Institute, due doubtless to the moderate charge and advertisement in the *Review*.

The total number of letters sent away was 1,884 (excluding those concerned with the distribution of the *Review*) of which 670 were replies to specific enquiries for information. The number of books, reprints and pamphlets loaned was 242 as against 155 in the preceding year. Binding of the current publications has been maintained out of the annual allotment for the library without the accumulation of arrears.

Staff Changes

Mr. W. F. Steven, M.A., A.I.C.T.A., served as Assistant Mycologist on a full-time temporary basis until October and then until the end of February on a half-time basis. Miss V. Broido was appointed as Abstractor on probation in April and became a member of the permanent staff in October. Mr. V. Akimoff, Second Abstractor, reached retiring age in July, but his services were retained on a half-time basis for a further year.

A new post of Assistant Mycologist on probation was advertised in February, applications being acceptable until the first week in April; a considerable number was received.

Miscellaneous

By kind invitation of the Director, all members of the staff attended a course of lectures on Air Raid Precautions at the Royal Botanic Gardens, Kew, between May and September.

The inspection of banana plants passing through quarantine in the special glasshouse at the Royal Botanic Gardens, Kew, for the collection at the Imperial College of Tropical Agriculture in Trinidad has been continued. The destruction of some of the plants was recommended due to symptoms very suggestive of an infectious virus disease. Consignments of cacao pods from Trinidad and Nigeria and the seedlings raised from them passing through quarantine at the Gardens have been inspected also. No instances of Witches' Broom Disease have been detected.

S. F. ASHBY.

APPENDIX III

FARNHAM HOUSE LABORATORY
SUPERINTENDENT'S REPORT FOR 1938–39

One hundred and ten consignments of beneficial insects, comprising a total of 485,640 specimens, were sent out from Farnham House Laboratory to Empire States, as shown in the following Table :—

Country	*Shipments*	*Specimens*
Great Britain	17	65,378
Canada	46	367,020
Australia	35	46,858
New Zealand	2	500
India	2	2,000
Kenya	3	2,700
Ceylon	2	700
Mauritius	2	414
Malta	1	70
	110	485,640

The number of consignments sent from the Laboratory is somewhat greater than the preceding year, but the number of individuals sent out shows a very great falling off. That is due, as during the previous year, simply to the fact that the Laboratory concentrated, at the request of Empire Governments, on certain projects in which large amounts of material were not available for collection; but the political crisis in Central Europe had also a detrimental effect on our work in that region.

The contributions received from Empire Governments and private sources for work during the financial year totalled £3,474 19*s.* 10*d.* Under this head Canada provided a total of £2,027 13*s.* 8*d.*, which excluded the sum of £169 13*s.* 1*d.* unpaid on the 1st April, 1939; the Forestry Commission of the United Kingdom provided the sum of £674 12*s.* 10*d.*, which does not include a credit balance of £18 18*s.* 3*d.* carried over from the previous year; the Government of New Zealand provided the sum of £660 12*s.* 10*d.*, which includes an advance of £300 provided for Thistle work, but it does not include a credit balance of £5 17*s.* 9*d.* carried over from the previous year; the Government of Mauritius provided the sum of £113 0*s.* 11*d.*, which includes a balance of £61 8*s.* 3*d.* carried over from the previous year; the Bournville Village Trust provided a sum of £8 19*s.* 7*d.*

The main projects which were undertaken by the Laboratory during the financial year 1938–39 were as follows :—

INSECTS AFFECTING CEREAL AND FORAGE CROPS

WESTERN WHEAT-STEM SAWFLY (*Cephus cinctus*, Norton).

The preliminary survey for suitable collecting grounds for the parasites of the Wheat-stem Sawfly was carried out, as in the previous year, by Mr. D Berryman. The material secured was examined and sorted out at the Laboratory during the autumn and winter. A total of 11 shipments of parasitized cocoons in wheat stubs, comprising 60,934 specimens and 10 shipments comprising 1,696 specimens of the Chalcid, *Pleurotropis benefica*, was despatched to Canada.

A sample consignment of stubble was sent to Dr. H. L. Parker of the United States Laboratory in Paris.

Toward the end of the financial year, Dr. M. G. Walker began a study of the field surveys of *Cephus pygmaeus* carried out during the last five or six years, with the object of discovering whether any simple numerical relationship exists between the density of wheat plants, the numbers of *Cephus*, and the percentage of parasitism by *Collyria calcitrator*. A paper embodying the results obtained during this investigation will be published shortly.

INSECTS AFFECTING DECIDUOUS FRUITS

Woolly Aphis of the Apple (*Eriosoma lanigerum*, Hausm).

Fourteen consignments, comprising approximately 63,200 specimens of the parasite *Aphelinus mali*, Hald. were sent to correspondents in Great Britain and two consignments of 2,000 specimens of *Aphelinus* were sent to India, where the parasite is being distributed in the Province of Kashmir.

It will be noted that the amount of material of *Aphelinus mali* sent out during the financial year greatly exceeded all previous records, and it appears that as a result of the successes obtained the demand for the parasite among English fruit growers is rapidly increasing.

INSECTS AFFECTING FORESTS AND SHADE TREES

The White Spruce Sawfly (*Diprion polytomum*, Htg.).

At the request of the Canadian authorities the collection and study of parasites of the Spruce Sawfly and its allies was continued during the financial year. As a result of consultations between the Canadian Entomological Service, the United States Bureau of Entomology, and the Entomologists of Farnham House Laboratory, plans for a co-operative study of the Spruce Sawfly and its parasites were worked out. An Entomologist of the United States Department of Agriculture, Mr. W. F. Sellers, assisted by an Austrian Entomologist, Dr. G. Bergold, were assigned for work in Northern Europe. After visiting Dr. J. Eliot Hardy in Prague and studying the methods used by him, they proceeded to Sweden and Finland where they made extensive surveys. In the meantime Dr. Hardy and his assistant, continued their studies and collections in Czechoslovakia and Roumania. As a result of this work 6 shipments comprising 83,057 specimens of the Sawfly, and 1 consignment containing 70 puparia of a Tachinid parasite, were despatched to Canada.

The relatively small amount of material obtained in spite of the great efforts made by the workers in the field was due, on the one hand, to the extremely severe weather which prevailed in the infested areas of Czechoslovakia at the beginning of the season and affected very adversely the incidence of the Sawfly population, and on the other, to the political tension between Czechoslovakia and Germany. As result of this, conditions in the neighbourhood of the frontier where the best collecting grounds were situated, became very difficult for Dr. Hardy and his assistants. In late summer some collecting grounds were discovered, but the political situation became acute before it was possible for Dr. Hardy to complete his collections in them. On 14th September it was found necessary to recall Dr. Hardy, who succeeded in leaving Czechoslovakia a few days before the frontier was closed. Some of the most valuable assistants employed in the work were subsequently mobilised and although every effort was made to continue the collecting work with the help of assistants unaffected by military measures, it was not found possible to make full use of the information that had been obtained. The subsequent annexation of Bohemia by Germany has created a situation rendering the continuation of our studies in Czechoslovakia virtually impossible, at least for the moment, and it is not expected that any further collections will be made in that part of Europe during the coming Season. However, the investigations carried on by the American Entomologist in Sweden and Finland, though they did not produce a large amount of material, suggest that favourable collecting grounds exist in those regions, although it is feared that difficulties of communication and labour may make the work exceptionally complicated and expensive.

At the request of Dr. Gibson, Chief Entomologist of Canada, who was attending the International Entomological Congress in Berlin as a delegate of the Canadian Government, Dr. Hardy spent some days in Berlin discussing the Sawfly work with Dr. Gibson and the Superintendent, and subsequently accompanied Dr. Gibson to Prague, Budapest and Vienna, where they visited Spruce areas affected by the Sawfly and discussed the arrangements for future collections.

Dr. S. G. Smith of McGill University came to England in the Autumn of 1937 in order to carry out an investigation of the cytology of the various races of the Spruce Sawfly. The greater part of his studies were carried out in the Zoological Department of the University of London, but he spent some time during the Spring and Summer months working at Farnham House Laboratory, where he bred the insects required for his investigations. In the Autumn of 1938 Dr. Smith returned to Canada.

HOLLY LEAF MINER (*Phytomyza ilicis*, Curt.).

The studies on this insect and its parasites were continued by Dr. Cameron. Part of the results obtained were submitted by him as a thesis for the Ph.D. in the University of Edinburgh, and are now in course of publication in the Bulletin of Entomological Research.

Five consignments comprising 130,000 parasitized larvae and puparia of the Holly-leaf Miner were sent to Canada during the course of this financial year.

BALSAM BARK LOUSE (*Chermes* (*Dreyfusia*) *piceae*, Ratz.).

Dr. Cameron, who continued the investigation of this problem, despatched to Canada six consignments of the eggs of the predator *Hemerobius stigma*, comprising 4,290 specimens. These were reared at the Laboratory from material collected in infested areas in the field.

LARCH CASE BEARER (*Coleophora laricella*, Hubn.).

Two consignments comprising 59,900 specimens were despatched to Canada as a result of the work of Dr. E. Cameron on this project.

PINE BARK BEETLES (*Myelophilus piniperda*, L.).

Mr. H. S. Hanson devoted the greater part of the financial year to the supervision of the experiments carried out with this important pest in the principal pine growing areas of England, Scotland and Wales, in co-operation with the officers of H.M. Forestry Commission and private owners.

After the work in the field had been completed Mr. Hanson returned to the Laboratory to write up the results of the work. A second paper on the ecology and control of pine beetles has been prepared and is now in the course of publication.

WOOD WASPS (*Sirex* spp.).

Mr. H. S. Hanson has prepared an extensive paper on the *Sirex* wood wasps and their parasites, which is being published by the Bulletin of Entomological Research. It is now known that one of the most important parasites of this pest has been established in the forests of New Zealand, as a result of the liberations of parasites sent from Farnham Royal to New Zealand a number of years ago.

PINE CHERMES (*Chermes pini*).

The authorities of the Bournville Village Trust, who complained of the damage occasioned by the Chermes in the woods of the Estate and asked for beneficial insects likely to be of use against the pest, were supplied with three consignments comprising 2,178 specimens of the Coccinellid, *Exochomus quadripustulatus*. They had been advised that this predator might already be present in the area, but later reported that an investigation by their Forester had revealed no trace of it. The *Exochomus* were liberated on infested trees and were observed immediately to begin feeding on the Chermes.

INSECTS AFFECTING GARDEN CROPS

DIAMOND BACK MOTH (*Plutella maculipennis*, Curt.).

Work on this project was continued throughout the year by Dr. D. C. Lloyd, in collaboration with Mr. J. Muggeridge, Chief Entomologist of New Zealand. One consignment comprising 300 specimens of *Apanteles plutellæ* and one consignment comprising 200 specimens of *Diadromus collaris*, were made up from material reared at the Laboratory and taken to New Zealand by Mr. Muggeridge in October.

A paper entitled "*Plutella maculipennis*, Curt., its Natural and Biological Control in England," by Dr. J. Eliot Hardy, was published in the Bulletin of Entomological Research.

Dr. D. C. Lloyd made several visits to Holland during the course of the year in connection with this project.

PEA MOTH (*Cydia nigricana*, Steph.).

The work on this project was continued by Dr. Cameron, who published in the Bulletin of Entomological Research a paper entitled "A study of the Natural Control of the Pea Moth, *Cydia nigricana*, Steph."

Four consignments comprising 27,000 specimens of cocoons of the Pea Moth were despatched to Canada, where they arrived in good condition.

MISCELLANEOUS INSECTS

WHITE GRUBS (*Melolontha melolontha*, etc.).

Work on this project was carried on by Dr. M. G. Walker with funds supplied in part by the Forestry Commission and part by the Government of Mauritius. A great deal of valuable information was gained in regard to the distribution and biology of the parasite, *Dexia rustica*. The breeding of this species in the Laboratory was successfully continued.

Two consignments comprising 414 grubs of *Melolontha melolontha* parasitized by *Dexia rustica*, were despatched to Mauritius.

MEALY BUGS (*Pseudococcus* spp.).

Three consignments comprising 2,700 specimens of *Leptomastix dactylopii* bred at Farnham Royal from stocks originally received from the Dominion Parasite Laboratory at Belleville, Canada, were sent to Kenya, where experiments are to be made with this species against the Coffee Mealybug.

THISTLE INSECTS

Work on the insects attacking the Spear Thistle, *Carduus lanceolatus*, was continued by Mr. R. J. Spittle. It is hoped that some of the insects attacking this thistle may be of use against the nearly related *Carduus marianus*, which is a pest in New Zealand. A stock of the seeds of *Carduus marianus*, which is known as the Variegated Thistle, has been received from New Zealand, and plants reared from these seeds will eventually be used in tests with the insects obtained from *Carduus lanceolatus*.

AUSTRALIAN WORK

Mr. Stanley Garthside, of the Division of Entomology of the Commonwealth Council for Scientific and Industrial Research, has continued his investigations of Australian plant and insect pests at Farnham Royal. Mr. F. Wilson is continuing his studies of Australian pests and their natural enemies at Lavandou, near Hyeres, on the French Riviera.

Thirty-five consignments comprising 46,858 specimens, and including 11 beneficial species, have been sent to Australia during the course of this work.

RESEARCH WORK.

A paper by Dr. D. C. Lloyd embodying the results of his experiments on the problem of host selection and entitled "A Study of some Factors Governing the Choice of Hosts and Distribution of Progeny by the Chalcid *Ooencyrtus kuvanæ*, Howard," was accepted for publication by the Royal Society and published in the Philosophical Transactions.

At the request of the Ministry of Agriculture the Superintendent prepared a new edition of the Ministry's Bulletin on Beneficial Insects. He also published a paper in Parasitology on "A Dipterous parasite of Mycetophilids."

Dr. J. Eliot Hardy published a paper on the "Biological Control of Insect Pests" in the Journal of the Royal Society of Prague.

VISITORS

Mr. J. Muggeridge, Chief Entomologist of New Zealand, arrived at Farnham Royal on April 12th and remained at the Laboratory until the 24th June, studying the work of the Laboratory and discussing problems of interest to New Zealand with the Superintendent and other members of the staff, devoting particular attention to the problems of the Cabbage Butterfly and the Diamond Back Moth. On 24th June he left, accompanied by an interpreter, for a tour through cabbage growing regions of the Continent. He attended the International Entomological Conference at Berlin where he was joined by Dr. D. C. Lloyd who accompanied him on the return trip through Germany and France. On the 7th October, Mr. Muggeridge left to return to New Zealand.

Three Indian Entomologists spent varying periods at the Laboratory studying the work and methods in use there; Dr. B. L. Rawat arrived on the 11th July and left on 31st August; Dr. K. N. Trehan, who had been working at Rothamsted Experimental Station arrived on July 14th and remained until July 20th; Dr. S. A. Shah arrived on November 25th and remained until December 2nd.

Other visitors to the Laboratory included Mr. L. A. Strong, Chief of the Bureau of Entomology of the United States Department of Agriculture, who called at the Laboratory accompanied by Mr. Sasscer, Mr. Parker and Mr. Walters, to discuss the work of the Spruce Sawfly; Dr. Arthur Gibson of the Canadian Entomological Service, Mr. L. D. Cleare of British Guiana, Mr. C. T. Gimingham of the Plant Pathological Laboratory, Harpenden, Dr. A. J. Nicholson, Chief of the Federal Entomological Service of the Commonwealth Council, Scientific and Industrial Research of Australia, accompanied by Mrs. Nicholson, Dr. Mohammed Kamal of the Cotton Research Institute, Egypt, Mr. A. H. Cockayne of the New Zealand Department of Agriculture, and Mr. Nevill L. Wright of the New Zealand High Commissioner's Office, and Major General Sir Alfred Knox, M.P., accompanied by his Secretary, Captain E. C. Kennedy, R.N.

MISCELLANEOUS

In August, 1938 the Superintendent attended the International Entomological Conference in Berlin, as a Delegate of H.M. Government of the United Kingdom and of the Royal Society.

STAFF

R. J. Spittle, Laboratory Steward, resigned on the 6th August.

F. Hall and D. Thadwald were for short periods employed as Junior Laboratory Stewards.

F. Alford was appointed as Junior Laboratory Steward on the 2nd February, 1939, at a salary of £104 p.a.–£6 10*s*.–£201 10*s*.

LIBRARY AND EQUIPMENT

The library now includes 762 bound volumes and 5,434 separates.

A cold room, installed at a cost of £232, was built during the month of March, in order to provide space for consignments of beneficial insects that have to be stored at the Laboratory while waiting shipment. This badly needed equipment will greatly facilitate many lines of practical and scientific work carried out at the Laboratory.

RECOGNITION OF THE LABORATORY BY THE UNIVERSITY OF LONDON

At an application of the Superintendent of the Laboratory to the authorities of London University, the Laboratory was visited and inspected by a Committee appointed by the Senate for the purpose. On a favourable Report by this Committee the Senate resolved that the Laboratory be recognized as an Institution for the training of students in Entomology, proceeding to advanced degrees in the University of London and later resolved that the Superintendent be appointed a Recognized Teacher and assigned to the Faculty of Science. The Laboratory is therefore now able to accept students from any part of the world who wish to proceed to advanced degrees provided they possess the necessary academic qualifications.

PARASITE CATALOGUE

Parts I and II of the Parasite Catalogue have been checked and typed, and Part III has been checked during the year. Parts I and II and now at the British Museum for final checking.

The records from R.A.E. and other sources for the period subsequent to those contained in the catalogue have been kept up to date, and approximately 20,000 records have been made, owing to the inclusion of those of Leonardi.

W. R. THOMPSON,
Superintendent.

APPENDIX IV

IMPERIAL BUREAU OF SOIL SCIENCE

DEPUTY DIRECTOR'S REPORT FOR 1938–39

1. STAFF:

Mr. A. J. Lloyd Lawrence, who had been scientific assistant since within a few months of the inception of the Bureau, resigned in March, 1939, in order to take up an appointment in the Chemical Defence Department of the War Office. Dr. Hugh Nicol, assistant bacteriologist at Rothamsted, has been appointed in his place.

2. PERIODICALS:

The first annual volume of " Soils and Fertilizers " has been well received and, in spite of its higher price, already enjoys a larger circulation that its multigraphed predecessor " Publications relating to Soils and Fertilizers." By arrangement with the International Society of Soil Science, every member of the Society was sent a complimentary copy of Vol. II, No. 1 in February, 1939, and as a consequence the number of subscribers in foreign countries, with which the Bureau is particularly anxious to make closer contact, has been considerably increased. An additional service is now offered to all recipients of " Soils and Fertilizers " by the inclusion as a supplement to alternate issues of the journal of the current list of new pamphlets and reprints obtainable on loan. The Bureau's lending service is thus made available without charge to all subscribers to the journal as well as to every research worker in the Empire.

The number of papers noticed in Volume I (1938) amounted to about 2,700.

3. TECHNICAL COMMUNICATIONS:

No. 37 " Soil Structure " (2*s*.) by E. W. Russell and No. 38 " Soil-borne Fungi and the Control of Root Disease " (2*s*. 6*d*.) by S. D. Garrett were published during the year under review.

In No. 37 Dr. Russell, after indicating the importance of his subject to agriculture, discusses the specification and description of soil structure and describes in detail various methods of aggregate analysis. A short section is devoted to the present unsatisfactory position of structure classification. Methods for controlling structure by cropping, cultivating, fertilizing and by adaptation to the climate are then described with special reference to the production of a crumb structure which Sokolovsky has described as the only structure having any agricultural value. Modern theories of crumb formation are explained and the paper terminates with a discussion on the relation between agricultural tilth and the structure of the soil. A bibliography of 100 references is included.

No. 38 is the first publication to deal with the control of the root-infecting fungi as a single ecological group of organisms. No attempt is made to catalogue individual diseases, the publication being concerned rather with the general principles, which are common to all soils and to all systems of cultivation, of root-disease control. Numerous examples are drawn from the literature relating to the control of such well-known diseases as Panama disease of bananas, *Phymatotrichum* root rot of cotton, *Fomes* root rot of rubber, black root rot of tobacco, potato scab, take-all disease of wheat, *Poria* and *Armillaria* root rots of tea, *Verticillium* wilt of the tomato, and others.

Acknowledgement of the rapprochement between the sciences of soil microbiology and plant pathology in this field is made in a chapter on the rôle of fungi in the soil, and another on the possibilities of biological control. A degree of return from the present highly artificial

systems of crop cultivation is predicted as a means of preserving the biological fertility of the soil, upon the maintenance of which not only the yield but also the health of our crops must eventually depend.

4. BIBLIOGRAPHY OF SOIL SCIENCE:

A second volume of the Bibliography of Soil Science, Fertilizers and General Agronomy, covering the years 1934–1937, was published in June, 1938. It includes about 7,500 references and complete indexes. The high cost of printing this publication precludes us from distributing free copies, but the work commands a ready sale and appears to be coming to be recognized as a standard reference book to soil science.

5. SALES OF PUBLICATIONS:

Receipts from sales for 1938–39 and 1937–38 are given below.

—	1938–39	1937–38
	£ s. d.	£ s. d.
Technical Communications	219 12 5	124 1 7
Soils and Fertilizers	235 4 8	139 0 7
Bibliographies of Soil Science	92 15 2	36 18 2
Miscellaneous	7 19 8	13 11 3
	£555 11 11	£313 11 7

A reprint of the soils and fertilizer section of "Reports on the Progress of Applied Chemistry" for 1938 by G. V. Jacks was sent free to all on mailing list, and a copy of the "Farmers Guide to Agricultural Research, 1937," published by the Royal Agricultural Society was sent to our Official Correspondents.

6. ENQUIRIES:

There was a fall in the number of enquiries received from 101 (in 1937–38) to 82. The enquiries were distributed over the five continents as follows (figures for 1937–38 in brackets).

Africa	8	(19)
America	12	(16)
Asia	17	(15)
Australia and New Zealand	15	(19)
Europe	30	(32)
	82	(101)

7. REPRINT LIBRARY:

370 new reprints were received and 143 were sent out on loan.

8. SUPPLY OF INDEX CARDS:

The number of cards issued under our scheme for issuing typed replicas of sections of our index rose to over 6,000 and owing to the increased work on the typing staff entailed thereby it has been found necessary to increase the price to 7*s.* 6*d.* a hundred and to restrict within general limits the numbers of cards that can be sent to each recipient.

9. VISIT TO FINLAND :

The Deputy Director attended the Conference of the Second and Fifth Commissions of the International Society of Soil Science at Helsinki in July, 1938.

10. ANNUAL MEETING OF AGRICULTURAL RESEARCH WORKERS :

About 70 members from the oversea agricultural departments and others interested in agriculture attended the annual meeting at Rothamsted on 28th June, 1938. The visitors made a tour of the experimental fields in the morning and after lunch inspected the laboratories and the Bureau.

G. V. JACKS,
Deputy Director.

APPENDIX V

POTATO EXPEDITION

In 1933–34 the Deputy Director of the Imperial Bureau of Plant Genetics made a tour of agricultural research stations in India, during which tour the future of potato breeding in India was discussed. As a result of this discussion the Deputy Director was requested to investigate the possibilities of sending a collecting expedition to South America, the home of the potato, on a co-operative basis, the funds to be provided jointly by the various Governments in the British Commonwealth. An unusually favourable opportunity for doing this presented itself in the form of the Percy Sladen Expedition to Lake Titicaca, which is the centre of the potato area; the leader agreed that Dr. P. S. Hudson and Mr. J. G. Hawkes should attach themselves to the Expedition and full arrangements were made for them to do so, afterwards separating from the Percy Sladen Expedition and travelling independently through the main potato zones making full collections of living material. Funds for this expedition were supplied collectively by the Governments of India, the United Kingdom, the Dominions and the Colonial Office. Owing to the unfortunate illness of Dr. Hudson at the time of departure the expedition had to be postponed and ultimately arrived in January, 1939, Mr. E. K. Balls taking the place of Dr. Hudson as leader.

The delay, had, however, proved favourable in that it had allowed fuller preparations to be made for the expedition proper and for the receipt and distribution of the material on its arrival; Mr. Hawkes was also able to visit the Soviet Union and make a thorough study of the systematics of cultivated *Solanum* based on the Russian collection. It was also possible to engage Mr. Balls to make additional potato collections in Mexico, which country he was visiting privately en route for South America, and which is an important centre of disease resistant potato species. On his way from Mexico to Peru, where the expedition proper began, Mr. Balls was also able to make a reconnaissance visit to Colombia and Ecuador, to which countries the expedition has later been able to return for fuller collections, largely thanks to the very efficient and economical way in which the available funds have been administered during the main part of the expedition.

Dr. SALAMAN'S REPORT

In answer to a request by Sir David Chadwick and the Agricultural Research Council, I undertook to act as curator in a voluntary capacity of the collection about to be formed of potato species and varieties from the American continent.

It was arranged that the glasshouse known as the Hills Bequest House and the large house occupied by Mr. Brenchley of the horticultural section should eventually be handed over to me for this purpose. The Hills Bequest House was ready for occupation early in 1938 and to it was added a large covered-in shed to allow of a duplicate set of plants being grown under short day conditions. The large horticultural house has only been in use since May of this year and indeed one-third of it is still being used by Mr. Brenchley pending the completion of the new house being erected for his work. Mr. Brenchley has this week vacated this portion of the house.

The Empire collection proper, which is being collected by Mr. Balls and Mr. Hawkes was, however, preceded by a consignment of some 80 different native potato varieties from Puno in the Lake Titicaca region, these had been collected through the courtesy of Mr. Soukup and brought over by Mr. Tutin of the Percy Sladen expedition. A further addition of much value was occasioned by a gift from the Russian Government of some 150 potato species and varieties from South America.

The first consignment from Mr. Balls came from Mexico and was received on May 12th, 1938; this has been followed by further parcels sent home as he made his way southwards. Up to date we have received 50 such consignments comprising 400 different varieties and species, as well as a considerable number of packets of true seed.

The collection has, therefore, already attained considerable dimensions, including as it does some 600 different specimens. It is already probably one of the biggest of its kind in the world.

Immediately on receipt of a consignment, the tubers have been placed in a 1/1,000 solution of $HgCl_2$ for 1½ hours, after which every tuber, which to date amounts to about 10,000, has been individually examined.

This examination has resulted in the discovery of wart disease in about half a dozen cases—all such specimens have been sent to Miss Glynne at Rothamsted. In addition, several cases of *Spongospora scabies*, Rhizoctonia and common scabies have been met with. Insect damage is common and a considerable number of larval weevils have been discovered and killed. These latter in most cases were destroyed by the immersion in perchloride.

Especial care has been taken to watch out for the occurrence of wart disease in the secondary crops grown on in the glasshouse, but none has been observed.

Large consignments of the new material have been sent to Scotland, India, Ceylon, Canada, Australia, New Zealand and Malaya.

The sending of perishable material great distances has necessitated some experimentation. To put it in the cold storage chambers would ruin it. The chief problem was to prevent the very small tubers, of which so much of the species material consists, from drying up or/and rotting. We have found that the most successful and convenient method was to employ small cardboard boxes 5 × 3 × 3, each of which is subdivided into two divisions. Six such boxes are put into a large cardboard container and two to six such containers can be readily made into one secure packet. The tubers are embedded within the sub-compartments in fine granulated peat which is damped. They have arrived with very few exceptions in excellent condition.

We have by now grown on one crop of every variety received and, in the case of the material received earlier, two and in some cases three crops.

The entire collection, occupying at any one time about 1,000 pots, has been both grown and stored under insect-proof conditions. Divided trays each containing eight rectangular receptacles have been provided for this purpose.

Although every effort has been made to deal with the material directly it arrived, we have not succeeded in getting all of it to grow. Certain material sent from North Argentina, as well as some from Mexico, consisted of minute tubers often less than ¼-in. diameter; much of this, notwithstanding that it was sent by Air Mail, arrived either rotten, mummified, or failed to grow. Other material has never emerged from its doorway, we have used hortomone without success and lately have proceeded to peel tubers which refuse to sprout. This latter procedure has in most cases brought about a break in the dormancy and the formation of sprouts.

Before Mr. Hawkes' departure for Peru, we drew up together a detailed scheme for the recording of the taxonomic characters of the material, which we had printed. To date, I have described about 60 of the more distinct species as they appear when grown in the greenhouse. It will be necessary later to compare these with descriptions of the same types grown in the field, both in their native habitat and in Cambridge. Mr. Hawkes has sent home a considerable amount of herbarium material between sheets of newspaper. The first batch of this Mr. Wortley and myself have attempted to reset on herbarium paper.

Dr. Ellerton of the Imperial Bureau of Plant Breeding and Genetics has recently fixed suitable material from the collection for later cytological study. This should enable Mr. Hawkes to determine the chromosome numbers of several of the less well-known species during the coming winter.

An attempt has been made to study and test out the character of some at least of the material. Thus the whole of the Sladen collection was tested for blight resistance and found to possess none. The new material from Mexico, as well as much of the new material collected by Balls and that from Russia, has been tested for resistance against the two types of blight,

Phytophthora infestans, which have been isolated at the Station, and a considerable number have exhibited resistance to one and sometimes to both forms.

My main personal interest in the collection lies in the possibility of finding in it genetic material which would enable me to improve on the blight-resistant stocks which I have built up during the last twenty years; at the same time I would like to introduce into these stocks resistance to some of our more virulent virus diseases. Towards the latter object no progress up till now has been made. Mr. Pettersson, who has at my request tested a considerable section of the collection for its resistance to the two forms of *Phytophthora*, has found that whilst many of the wild Mexican *demissum* types are resistant to both forms of blight, a minority is susceptible to both. All the cultivated Puno varieties have proved to be susceptible. A few species from South America sent from Russia have proved immune.

With this new knowledge in hand, I have made an intensive effort to obtain hybrids between certain of the new resistant forms and my own resistant types and particularly with selected English commercial varieties. Out of a very large number of such hybridizations a few promise to yield seed.

I have so far sketched briefly the building up and preliminary examination of this collection, it is necessary that a few words should be said as to its future. It is not for me to say what should, still less what must be done to conserve it—my duty is to point out its potential value.

One thing, however, must be made clear, to maintain a collection such as this is not a simple matter of storage and gardening. The collection needs the expert care of a curator who understands the potato and above all is prepared to guard it against the ever present danger of mass virus infection. If protection against virus were to be suspended, a collection, which may have cost several thousands of pounds to gather together, will be practically valueless in a couple of years. In any considerations of the future this all important point must be borne in mind.

I have elsewhere made clear my own conviction that potato breeders, so long as they use existing commercial stocks as parents, have come to the end of their tether. No essential progress is in my opinion possible, no protection against blight nor virus disease, no resistance to frost or drought can be expected till we bring into the field of our operations parents possessing one or other of these genetic characters.

Amongst one or other of our wild stocks such characters are actually existent, but they are generally combined with highly undesirable economic characters. It is up to the skilful breeder to incorporate the one and reject the other in his synthesized product. By the use of our new material we should eventually be able to introduce, not only the qualities already referred to, but possibly others.

This it is noteworthy that a group of French and German biologists working together have found that some of the wild potato species are in one way or another immune to attack by the Colorado Beetle, whilst Reddick in America has noted that the wild *Commersonii* species are immune to common scab, a ubiquitous scourge which can reduce the market value of the crop by 10 to 50 per cent.

It is obvious that an Empire so widely scattered as ours needs varieties specially designed for specific environmental conditions. India is alive to this problem, others are beginning to think about it. It may yet be some years before the British Empire horticulturists become fully aware of the possibilities which are open to them and to which this collection forms the essential background. But in the day when social organization catches up with scientific progress, we may expect that the collection of potato specimens and varieties now in the making will be regarded as a national asset.

The growing, storage and maintenance of this large body of material has involved an enormous amount of work and I have to record my warm thanks to Mr. W. R. S. Wortley for his generous assistance and to Mr. L. Selmes, the head attendant of the Potato Virus Research Station.

R. N. SALAMAN.

APPENDIX VI

PUBLICATIONS

1. ANNUAL REPORTS OF THE EXECUTIVE COUNCIL OF THE IMPERIAL AGRICULTURAL BUREAUX:

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2. LIST OF AGRICULTURAL RESEARCH WORKERS IN THE BRITISH EMPIRE, 1938 (1939 edition in preparation) .. .. 5*s.* 0*d.*

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An Abstract of the Legislation in Force in the British Empire Dealing with Plant Pests and Diseases up to the Year 1920.

By E. Marguerite Ralfs, B.A. Med. 8vo. 65 pp. Paper Covers. Price, 2*s.* 6*d.* 1921.

Tsetse-Flies. Their Characteristics, Distribution and Bionomics, with some account of possible Methods for their Control.

By Major E. E. Austen, D.S.O., and Emile Hegh. Med. 8vo. 188 pp. With 5 plates and 19 figures. Paper Covers. Price, 7*s.* 6*d.* Postage 4*d.* extra. 1922.

The Phases of Locusts in South Africa.

By Prof. J. C. Faure. Roy. 8vo. 132 pp. Paper covers. With 6 coloured, 19 black-and-white plates and 1 map. Price 12*s.* (Reprinted from the Bulletin of Entomological Research, Vol. XXIII, Pt. 3. September, 1932.)

Locusts and Grasshoppers. A Handbook for their Study and Control.

By B. P. Uvarov. Imp. 8vo. Pp. xiii and 352. With 9 plates and 118 text figures. Bound in Buckram. Price 21*s.* net. Postage, inland, 7*d.*; abroad, 1*s.* 3*d.* 1928.

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